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Final Environmental Impact Statement

LOWER COOK INLET - SHELIKOF STRAIT

Alaska Outer Continental Shelf Office

Proposed Oil and Gas Lease
Sale 60

1981

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UNITED STATES
DEPARTMENT OF THE INTERIOR

FINAL ENVIRONMENTAL IMPACT STATEMENT PROPOSED OUTER CONTINENTAL SHELF OIL AND GAS LEASE SALE LOWER COOK INLET/SHELIKOF STRAIT

Prepared by the
BUREAU OF LAND MANAGEMENT

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FINAL ENVIRONMENTAL IMPACT STATEMENT

Proposed Outer Continental Shelf
Oil and Gas Lease Sale
Lower Cook Inlet/Shelikof Strait

Summary Sheet

( ) Draft (X) Final

U.S. Department of the Interior, Bureau of Land Management, Alaska OCS Office, P.O. Box 1159, Anchorage, Alaska 99510.

1. Type of Action: Proposed Oil and Gas Lease Sale, Lower Cook Inlet/Shelikof Strait.

(X) Administrative ( ) Legislative

2. Description of the Action: A total of 349917 hectares of OCS lands are proposed for leasing action. The 153 blocks which may be leased are located in lower Cook Inlet and Shelikof Strait and are 5 to 37 kilometers (3 to 23 mi) offshore in water depths that range from 15 to 210 meters (49 to 689 ft). If implemented, this sale is tentatively scheduled to be held in September 1981.

3. Environmental Impacts: The probability of an oilspill impacting significant ecological resources is considered in the impact analysis and is based on an oilspill risk model (USGS, 1980). Given an estimated amount of resource, and incorporating historic spill data, the model simulates the trajectories of oilspills from hypothesized spill points. It must be emphasized that the trajectories simulated by the model represent only hypothetical pathways of oil slicks and do not involve any direct consideration of cleanup, dispersion, or weathering processes which would determine the quantity or quality of oil that could eventually come in contact with sections of coastline or specific resources. Assuming the 5-percent probability that commercially recoverable amounts of oil/gas are discovered in the proposed sale area, and that production occurs, there is a 98-percent probability that at least four 1,000-barrel oilspills could occur during the estimated 26-year life of the field (USGS, 1980). Viewed in this respect, all blocks in the proposed sale area pose some degree of pollution risk to the environment. The potential effects of a large (1,000 bbl) oilspill are discussed below and in greater detail in section IV of this EIS. Chronic oilspills and spills smaller than 1,000 barrels would likely occur during the life of the project and could result in adverse effects on the environment and other resource uses. Onshore development would result in socioeconomic impacts which could have State, regional, and/or local implications.

Potential impacts have been analyzed with the view that all pertinent laws of the United States would be in effect and would act to shape and/or mitigate impacts. Several block deletion alternatives and mitigating measures may be applied which could reduce the occurrence and extent of adverse impacts associated with this proposal. Other measures, which are not the responsibility of the Department of the Interior, have been identified. Despite mitigating measures, some impacts are considered unavoidable. For instance, it is a possibility that oilspills could occur, some disturbance to fishery and wildlife resources could occur, and some onshore development could occur in undeveloped areas.

A summary of probable impacts resulting from the proposed action follows:

Assuming the 5-percent probability that oil and gas are discovered in economically recoverable amounts and, assuming that an oilspill occurs, the spill would have a 94-percent chance of reaching coastal habitats within 10 days after the spill. The probability of a spill reaching coastal habitats is high because the proposed sale area is relatively close to the shoreline. Although species would be variously affected, intertidal dwelling species, such as razor clams, could be destroyed outright or tainted for a period of up to 1 year.

Groundfish, halibut, and other populations of demersal fish species in the Shelikof Strait area may be reduced by the effects of oilspills by some unquantifiable amount during the life of the proposal. This is especially true of halibut, a species widely distributed within the strait and whose larvae are subject to pollution risk for 6 months of the year. Salmon generally are the most vulnerable of the commercial species to pollution events due to their dependence on inshore areas. Pink salmon populations are more susceptible to the effects of pollution than other salmon species. A pollution event could adversely affect a year class or more of fry, as well as a year class or more of adults. Pink salmon populations that use the streams on the west side of Kodiak Island, particularly between Uganik Bay and Malina Bay, and those that spawn in Kamishak Bay, would be more adversely affected from an oilspill event than elsewhere in the area. Salmon using western Kodiak streams could lose an entire year class, an effect that could last for 5 years or more.

The Uganik Bay to Malina Bay area of Kodiak Island and other sections of the Shelikof Strait pose high risk from a pollution event to crab, shrimp, and other shellfish. Impacts to such species would likely be local, but could be long term. The egg and larval forms of crab species are most susceptible to the effects of pollution events, although the cumulative effects of increased oil and gas production and transportation could directly affect adult crab populations to an unknown extent through contamination or reduction of food sources. This could also be true of shrimp and other shellfish, especially in the Shelikof Strait area. Potential oilspills pose a high risk to shrimp populations on the west side of Kodiak Island and in the larval drift area off Kachemak Bay.

The proposed sale would have little or no affect on the Kodiak, Homer, Port Lions, Seldovia, and Kenai commercial fisheries as a whole. Fisheries impacts that may occur from chronic and catastrophic oilspill events are expected to be localized. Multiple-use conflicts between oil and gas activity and commercial fishing should be localized, of relatively short duration, and subject to remedial action.

Marine and coastal birds and their habitats could be severely impacted by an oilspill event, especially in the Shelikof Strait area. Major impacts (25-75% mortality of a bird species population) from spill incidents could occur in locations such as the Barren Islands, Shelikof Strait, Kupreanof Strait, and Whale Passage. This risk is especially high in the proposed Talnik Point

(Whale Pass) tanker terminal area. Some vulnerable bird species indicated in the impact discussion could take as long as 50 years to recover from a single 50 percent mortality event.

Among marine mammals, sea otter populations would likely sustain direct mortality as a result of oilspills, particularly the relatively dense populations of the northern Kodiak Archipelago. Harbor seals, particularly those of Kamishak Bay and the Shuyak-Afognak Islands, would likely be subjected to indirect effects through reduced habitat quality and/or food resources, but would be less likely than sea otters to sustain direct mortality. Major sea lion concentrations of the Barren Islands and Shelikof Strait would likely sustain indirect and, possibly, direct effects from oilspill incidents. Sea lions could lose from 1 to 2 years of productivity depending on the time of year a spill occurred. The siting of tanker facilities on eastern Kodiak Island would increase the risk of adverse effects on marine mammals of the Marmot Bay area and on marine mammal habitats of Portlock Bank, a major feeding area for sea lions, fur seals, and cetaceans.

It is possible that gray, fin, humpback, and possibly sei whales, endangered species which frequent nearshore habitats of the northern Kodiak Archipelago and Shelikof Strait, could be affected directly or indirectly if an oilspill occurred in these areas. Construction of tanker facilities on eastern Kodiak Island may lead to localized disturbance of cetaceans, and, as a result of tanker traffic, could pose oilspill risks to important offshore feeding areas, such as Portlock Bank.

The impacts from oil and gas production and transport on primary and secondary species (and associated habitat) harvested for subsistence purposes within village subsistence-use areas cannot be quantified at this time, but are assessed at a high probability of risk from oilspill incidents. The proposal would subject the subsistence of the Kodiak Island villages along Shelikof Strait to a higher potential risk from an oilspill than for those villages elsewhere in the proposed lease sale area. But, the cumulative effects of the proposal in relation to other oil and gas activities in the vicinity places the subsistence for the villages of English Bay and Port Graham at a risk approximating those of Kodiak Island villages. Port Lions and Ouzinkie would be additionally subject to the effects, undeterminable at this time, of chronic discharges and tankering incidents resulting from an oil terminal facility at Talnik Point. The same may be true of Homer near the possible Anchor Point environs terminal facility. The direct and indirect consequences at the village level of a major oilspill incident damaging locally-used subsistence resources and/or habitats could include restricted local hunting or fishing, for a duration consistent with the damage incurred; social and cultural stress associated with the shortage of customary and traditional resources in the places they are usually found; increased cost in time and money to replace lost resources, assuming local transportation means were suitable for using an extended harvest range; and problems of food distribution and local storage should crisis-oriented replacement programs be initiated.

Sociocultural systems impacts could be expected in Kodiak, Port Lions, and Homer with differing effects. The potential for confrontation would exist in Kodiak basically between fisheries-oriented residents and activities and newer oil-related residents and activities. Conflict could be intensified by a significant oilspill incident. Impacts on sociocultural systems of Port Lions also could be significant, including the addition of a substantial new subpopulation to the town, temporary degradation of the town environment during construction activities, and temporary reduction in the quality of life associated with these changes. In Homer, the potential for major oil and gas onshore facilities nearby would likely increase debate over the direction of community growth and character and could result in controversy similar to that experienced in Homer earlier over lease sale CI.

Port Lions could anticipate major population, employment, and economic stimuli if an oil storage and tanker terminal facility were sited there. Being a small community with an expected slow (3%) annual rate of growth, the operations of an oil terminal facility and related functions could almost double the number of jobs available over the next two decades. Likewise, the Homer area would probably experience similar, though less extensive, effects if an oil terminal were to be located in the vicinity of Anchor Point. Homer is expected to be impacted less from OCS activities than from other sources of economic stimulus, which are expected to produce an employment growth rate of 5.2 percent annually during the next decade. This rate of growth in employment would increase to 6.5 percent with the lease sale. Elsewhere, the lease sale would be expected to produce only marginal increments in employment growth in the Kenai, Kodiak, and Anchorage areas and little or no economic stimulus to the villages on the Kenai Peninsula or Kodiak Island.

Significant impacts could be expected to all modes of transportation serving Port Lions. A major expansion of the Port Lions airfield, possibly including extension of the runway into Kizhuyak Bay, would be required for the facility to function as a forward air support base to OCS operations in Shelikof Strait. Air traffic volume would increase dramatically, especially during the development phase, as would ground traffic in and around Port Lions. An additional 21 kilometers (15 mi) of roadway would be required to connect the airfield with the oil storage and marine tanker terminal near Talnik Point, as well as to service the onshore pipeline system. The operations near Talnik Point would produce the primary marine transportation impacts, in the short run, through summer barge traffic of rock and construction materials to the site. This would temporarily interfere with fishing in Kizhuyak Bay. The impact of tanker traffic (approximately 5 vessels per month) to and from an oil facility near Talnik Point, could produce the long-term impact of reducing the availability of nearby fishing grounds over the life of the facility. The navigational uncertainties of Whale Passage suggest it would be unlikely that a marine service and supply base would be constructed at Port Lions. Thus, there would be no impact from this source. Transportation impacts from this proposed sale would likely be minor to insignificant in the Anchorage area and minor to moderate, especially with respect to ground transportation, on the transportation systems of the Kenai Peninsula.

The cumulative effects which could result from the proposed action and other major projects (sec. IV.A.1.h.) would be similar to, but more extensive than the impacts which have been previously described with the exception of transportation. A major cumulative effect in marine traffic congestion could result if the need arises to simultaneously construct an oil facility at Talnik Point and the Port Lions small boat harbor. Increased marine traffic, approximating 30-40 percent of all tanker traffic generated in the next decade, would be the principal cumulative effect with regard to transportation within Cook Inlet.

4. Alternatives to the Proposed Action:

a. No Sale (alternative II).

b. Delay the Sale (alternative III).

c. Modify the Proposed Sale by deletion of 19 blocks in lower Cook Inlet and 66 blocks in Shelikof Strait (alternative IV).

d. Modify the Proposed Sale by deletion of 19 blocks in lower Cook Inlet and 81 blocks in Shelikof Strait (alternative V).

e. Modify the Proposed Sale by deletion of all blocks in lower Cook Inlet (86 blocks) (alternative VI).

f. Block deletion alternatives recommended by individuals, agencies, and organizations as a result of public review of and comment on the DEIS (see sec. IV.B. of this EIS).

5. Scoping comments were requested from the following:

Federal Agencies
- Department of Agriculture
  - Forest Service
- Department of Commerce
  - National Marine Fisheries Service
  - National Oceanic and Atmospheric Administration
  - Office of Coastal Zone Management
  - Office of Ecological and Environmental Conservation
- Department of Defense
  - Air Force
  - Army Corps of Engineers
  - Naval Operations
- Department of Energy
- Federal Energy Regulatory Commission
- Department of the Interior
  - Bureau of Indian Affairs
  - Bureau of Land Management, State Director
  - Bureau of Mines
  - Fish and Wildlife Service
  - Geological Survey
  - Heritage Conservation and Recreation Service
  - National Park Service
  - Office of Aircraft Services
  - Special Assistant to the Secretary
- Department of Transportation
  - Coast Guard
- Department of the Treasury
- Economic Regulatory Administration
- Environmental Protection Agency

State of Alaska
- The Honorable Jay S. Hammond, Governor
- Department of Administration

Department of Commerce and Economic Development
Department of Community and Regional Affairs
Department of Environmental Conservation
Department of Fish and Game
Department of Health and Social Services
Department of Labor
Department of Law
Department of Natural Resources
Department of Public Works
Department of Revenue
Department of Transportation and Public Facilities
Office of Coastal Management
Office of the Governor
  Division of Policy Development and Planning,
  State-Federal Coordinator
University of Alaska

Local Government
Anchorage Municipality
  Honorable George Sullivan, Mayor
Homer Municipality
  Honorable Leo Rhode, City Mayor
  Larry Farnem, City Manager
Kenai Peninsula Borough
  Honorable Don Gilman, Mayor
Kodiak, Alaska
  Gary Stevens, City Mayor
  Claire Harmoney, former City Manager
Kodiak Island Borough
  Honorable Betty Wallin, Borough Mayor
  Stuart Denslow, former Borough Manager
  OCS Advisory Council
Matanuska-Susitna Borough
  Honorable Ron Larson, Mayor

Native Organizations
Kodiak Area Native Association
Kodiak Island Native Health Authority
Koniag, Inc.

Special Interest Groups
Alaska Conservation Society
Alaska Packers Association
Alaska Pacific Seafoods
Alaska Shrimp Trawlers Association
B & B Fisheries
Citizens Coalition of Coastal Communities
Columbia-Ward Fisheries
Cook Inlet Commercial Fishermen
East Point Seafood Company
The Homer News
Kachemak Bay Conservation Society
Kachemak Bay Defense Fund
Kenai Peninsula Fishermen's Cooperative Association

Kodiak Area Community Development Corporation, Inc.
Kodiak Historical Society
Kodiak King Crab, Inc.
League of Women Voters of Kodiak
M. V. *All Alaskan*
New England Fish Company
New Northern Processors, Inc.
North Pacific Fisheries Association, Inc.
North Pacific Processors
Pacific Pearl
Pan-Alaskan Fisheries
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I. PURPOSE FOR ACTION

The Federal Government is authorized by the OCS Lands Act, as amended (see sec. I.C.), to preserve, protect, and develop oil and gas resources in the OCS. These responsibilities must be carried out consistent with the need to make these resources available to meet the nation's energy needs as rapidly as possible, to balance orderly energy resource development with protection of the human, marine, and coastal environments, to ensure a fair and equitable return on these resources, and to preserve and maintain free enterprise competition. Section 21(b) of the act provides for establishing a program to insure that OCS technologies are continuously and systematically reviewed to insure the best available and safest technologies (BAST) are applied to OCS operations. A U.S. Geological Survey report describes the use of best available and safest technologies during oil and gas drilling and producing operations on the outer continental shelf (USDI, 1980).

This proposed action is part of the overall United States effort to reduce dependency on foreign sources of petroleum. Implementation of this proposal, assuming a commercial discovery, would contribute to the goals of ensuring uninterrupted energy supplies and reducing the balance of payments deficit resulting from petroleum imports.

A substantial imbalance exists between domestic oil and gas production, and consumption. Energy imports rose from 9 to 24 percent of the total energy supply over the 15-year period from 1962-1977, and despite increases in prices in recent years, energy imports almost doubled in the 5-year period from 1972 to 1977. Oil comprised 94 percent of the total energy imports in 1977.

The annual share of energy supplied by imports is forecasted to decline to 18 percent in 1990, compared to 24 percent in 1977. This reflects a net energy consumption growth rate of 1.8 percent per year during the period. This is significantly lower than the 2.6 percent annual growth rate experienced between 1962 and 1977, but shows a reversal in trend from the 0.5 percent annual growth rate in the 1972-1977 period.

Though other projections differ, including DOE's, under varying assumptions, it is clear that the United States will remain dependent on imported energy through this century. This dependency exposes the country to both threats of and actual interruption of imported energy supplies, having both national economy and security implications. Other energy forms, including solar, geothermal and nuclear fusion, will not significantly reduce dependence on foreign sources of energy before the end of this century. Therefore, the goal is to make OCS resources available to meet national energy needs consistent with the safeguards of the OCS Lands Act.

Reversal in the historical trend and/or prevention of its worsening depends heavily on Alaskan production maintenance or increase. The General Accounting Office has estimated that through the period of 1985-2000, Alaskan sources will be responsible for some 16 to 19 percent of all U.S. crude oil production. Similarly, the Alaskan contribution to U.S. natural gas production is expected to increase. By the year 2000, Alaska sources will comprise some 18.6 percent of all U.S. natural gas production.

A. Leasing Process: The Outer Continental Shelf Lands Act of 1953, as amended, charges the Secretary of the Interior with administering mineral exploration and development on the Outer Continental Shelf (OCS), as well as conserving natural resources of the shelf. The law requires that the Secretary of the Interior develop oil and gas, in an orderly and timely manner, to meet the energy needs of the country, to protect the human, marine, and coastal environments, and to receive a fair and equitable return on the resources of the OCS. The Secretary delegated responsibility for the leasing of submerged Federal lands to the Bureau of Land Management (BLM) and the responsibility for the supervision of offshore operations after lease issuance to the U.S. Geological Survey (USGS). BLM works closely with USGS, particularly on technical matters. USGS also supervises and regulates exploration, development, and production activities after the leases are issued. The leasing process is described in detail in appendix N.

B. Leasing History: The first Federal OCS lease sale in Alaska was held April 13, 1976, for the northern Gulf of Alaska (sale 39). Of the 186 tracts (408,134 hectares, or about 1 million acres) offered, 76 tracts (165,543 hectares, or 409,057 acres) were leased; the accepted high bids totalled $559,836,587.

Exploratory drilling on Federally leased tracts in the northern Gulf of Alaska began in September 1976, and resulted in 11 dry holes in the Yakataga shelf area. The last of the wells was abandoned in July 1978, and no further drilling activity has occurred nor is expected to occur. As of December 1980, 74 of 76 leases in the Gulf of Alaska issued pursuant to sale 39 have been relinquished.

The first Federal offshore oil and gas lease sale in Cook Inlet was held October 27, 1977 (sale CI). A total of 135 blocks covering 518,080 acres was offered on a cash bonus and variable royalty basis (46 blocks offered on a royalty basis and 89 blocks offered on a cash bonus basis. The total bonus received for the leased blocks was $398,471,313.36 of which 30 royalty blocks and 57 bonus blocks were leased, comprising 200,448 hectares (495,307 acres). At the present time, OCS leases in lower Cook Inlet are in the post-sale exploratory phase. As of July 1980, 8 exploratory wells and one COST well have been drilled in the area. No commercial finds have been announced. As of December 1980, 18 leases issued pursuant to sale CI have been relinquished and 69 leases remain active.

For a description of OCS oil and gas activities in the Gulf of Alaska and lower Cook Inlet and their onshore impacts, see Department of the Interior, U.S. Geological Survey Open-File Report 80-1028.

Since 1959, the State of Alaska has held 19 competitive oil and gas lease sales in upper Cook Inlet, leasing about 1.9 million acres. Total bonus revenues received by the State for these leases were about $90 million. The last State sale in Cook Inlet was held in 1974. Production figures for 1978 for upper Cook Inlet reflect 45 million barrels of oil and 65.5 million cubic feet of gas produced.

Lease sale 55 in the eastern Gulf of Alaska was carried out in October of 1980; an FEIS on this sale was released in March 1980. Of the 210 tracts

(483840 hectares, or almost 2 million acres) offered, 35 tracts (80640 hectares, or almost 200,000 acres) were leased; the accepted high bids totalled $109,751,072.96.

A DEIS on the lease sale 46 area (Kodiak) was printed in April 1977. A change in the leasing schedule was announced shortly after publication, changing the sale date to December 1980, and a second DEIS was prepared in December 1979. Public hearings were conducted in Kodiak in March 1980. Based on the low resource potential and interest in exploration and on concerns expressed by the residents and officials of the Kodiak area, sale 46 was canceled. A sale in the Kodiak area (proposed sale 61) is now scheduled to be held in April 1983. A DEIS on this proposal will be available in March 1982. If both sales 60 and 61 are held as scheduled, there will be oil and gas exploratory activities on both sides of Kodiak Island. The cumulative effects of both sales will be discussed in the DEIS on proposed sale 61 (off the east coast of Kodiak Island).

OCS leasing in the Cook Inlet area has been the subject of controversy and litigation. In 1967, the Federal government and the State of Alaska began a jurisdictional lawsuit involving Cook Inlet, which arose when the State prepared to permit oil and gas exploration and development in portions of lower Cook Inlet. This dispute was resolved by the U.S. Supreme Court in June 1975 (United States v. State of Alaska A-45-67, 422 U.S. 184), in which the court ruled that the State's proof was insufficient to establish Cook Inlet as an historic bay, and that the United States had paramount rights to the submerged land toward the lower or seaward portion of Cook Inlet.

The English Bay Village Corporation filed suit against the Cook Inlet sale CI in February 1977 (English Bay Village Corporation v. Secretary of Interior, Civil No. 77-174), alleging that the environmental impact statement did not meet NEPA requirements due to its failure to adequately discuss potential impacts to the village, and also its failure to discuss onshore support facilities siting and long-term impacts on lower Cook Inlet fisheries.

Interior Secretary Andrus canceled the sale in February of 1977. He rescheduled it to October of 1977. Following the sale, the English Bay suit was resumed. A settlement was entered in this case for amicable resolution of the suit and the case was dismissed in March 1978, subject to compliance by DOI with the settlement agreement.

As a result of the settlement agreement, USGS is required to prepare a developmental phase EIS for lower Cook Inlet leases should a discovery be made and to conduct a public hearing in English Bay. Also, studies on toxicity of drilling muds on biota are ongoing to determine adverse effects of exploratory drilling on fisheries in the area (Rice, 1980 and Rice, Korn, and Karinen, 1979). The results of these studies are anticipated by February of 1981 in draft form.

C. Legal Mandates and Authority: The description of legal mandates and authority for OCS leasing is contained in appendix O. The description contains a summary of the OCS Lands Act, as amended, and the provisions of the act for Federal/State coordination, the establishment of compensatory funds, and the environmental studies program. The functions of the National OCS Advisory Board and the Intergovernmental Planning Program are also included. As pointed out in comments by the State of Alaska (sec. V), the Intergovernmental Planning Program primarily serves an advisory function on technical matters of the OCS program.

D. Federal Regulatory Responsibilities: Federal regulatory responsibilities that affect the OCS leasing program are contained in appendix P. Responsibilities of components of the Departments of Interior, Transportation, Commerce, and Energy are described as well as those for the U.S. Army Corps of Engineers, the Environmental Protection Agency, and the Interstate Commerce Commission. The criteria for ocean discharge has been promulgated by the Environmental Protection Agency, published October 3, 1980, and is effective 30 days thereafter.

E. Relationship of the Proposed Sale to the Overall OCS Leasing Program: In compliance with the act, the Secretary of the Interior has approved and submitted a new proposed 5-year leasing program to the Congress, the Attorney General, and the governors of affected states. The Secretary is further directed to prepare, periodically revise, and maintain the oil and gas leasing program. The leasing program is to consist of a schedule of proposed lease sales indicating, as precisely as possible, the size, timing, and location of leasing activity which will best meet national energy needs for the 5-year period following its approval or reapproval. The goal of the leasing program is to provide for orderly development of OCS oil and gas resources and to maintain an adequate contribution of OCS production to the national supply in order to reduce dependence on foreign oil. The current 5-year leasing program, covering the period from mid-1980 through mid-1985, was approved by the Secretary in June 1980. Proposed sale 60 is scheduled for September 1981.

The United States has three overriding energy objectives outlined in the National Energy Plan:

> as an immediate objective that will become even more important in the future, reduce dependence on foreign oil and vulnerability to supply interruptions;
>
> in the medium term, to keep U.S. imports sufficiently low to weather the period when world oil production approaches its capacity limitation; and
>
> in the long-term, to have renewable and essentially inexhaustible sources of energy for sustained economic growth.

Full development of OCS resources is an integral part of that plan (the National Energy Plan, Executive Office of the President, Energy Policy and Planning, 1977).

The DEIS on the proposed 5-year OCS oil and gas lease schedule was released in August 1979. Public hearings were held in Anchorage in October 1979 and the FEIS was published in January 1980. The final 5-year schedule, which runs through May 1985, was approved by the Secretary in June 1980.

An OCS leasing program does not represent a decision to lease in a particular area. It represents only the Department's intent to consider leasing in certain areas, and to proceed with the leasing of such areas only if it should be determined that leasing and development in such areas would be environmentally, technically, and economically acceptable.

As reflected in the final OCS oil and gas leasing schedule (June 1980), proposed sale 60 in the lower Cook Inlet/Shelikof Strait is scheduled for September 1981. Another proposed sale in the area is sale 61 (Kodiak), scheduled for April 1983. Proposed sale 61 encompasses about the same area of call as the now cancelled sale 46. Tracts will not be selected for further study in a DEIS until February of 1981.

F. Results of the Scoping Process for Proposed OCS Sale 60: Due to the proximity, both in timing and location, of lease sales 46 and 60, an attempt was made to combine, whenever possible, the scoping efforts for the two sales. Many of the concerns and opinions expressed in regard to sale 60 were also expressed in previous meetings on sale 46. Public concern, especially in Kodiak, is equal for both sales, however, due to fishing season activities among other reasons, the open scoping sessions conducted in August 1979 were not as well attended as previous meetings. For this reason, the reader is invited to review section I.F. of the 1979 DEIS for lease sale 46 for additional insights into the concerns of the citizens of the affected area.

Three public scoping meetings were held for proposed sale 60. The first was a combined sale 46 and 60 session and was held in Anchorage on May 23, 1979. The meeting was advertised in the Anchorage papers as a public gathering. At the Anchorage meeting seven people participated. Four of the participants were from oil companies (ARCO, Marathon, Shell, and Texaco), one was from a Native corporation, one was from the Matanuska-Susitna Borough, and one individual represented the municipality of Anchorage. The concerns raised are shown below.

Issues Surfaced:

Proceed with the proposal.
The adequate treatment of environmental constraints on oil and gas operations.
Onshore impacts on the social and economic environment.

The second public scoping meeting was held on August 14, 1979, in the Kodiak Island Borough Assembly Hall. The turnout was low, most likely due to fishing activities. There were only 11 people present to represent the people of Kodiak. The results of the meeting are as follows.

Issues Surfaced:

Cumulative effects of lease sale 60 and the since-cancelled sale 46.
Impacts on the bottomfishing industry in particular, and fisheries resources in general.
Lack of fisheries and oceanographic studies regarding Shelikof Strait.
Impacts on the island's socioeconomic infrastructure, i.e., housing, social services, etc.
The need for clearly defining shipping lanes.
The handling, fate, and effects of drilling muds and cuttings.

Suggested Mitigating Measures:

Elimination of all blocks south of number 1055.
Cancellation of the lease sale.

The final public scoping meeting was held in Homer on August 17, 1979. Again turnout was low; six individuals were in attendance. The individuals present, however, represented a broad spectrum of local society. They were the Honorable Don Gilman, Mayor of the Kenai Peninsula Borough; Ms. Randy Somers of public radio station KBBI; Mr. Joseph Wills, editor of the Homer News; Mr. Kenton Bloom of the Kachemak Bay Conservation Society; Bob Ducker, president of the Kenai Peninsula Fishermen's Cooperative Association; and Ms. Lettie Edleman, vice president of the same organization. The issues of concern that were raised and mitigating measures suggested are as follows.

Issues Surfaced:

Possible interference with the commercial fishing operations, specifically, the driftnet salmon fishery, shellfish, and bottomfish fisheries.
Land use and coastal management impacts, particularly in regard to facilities siting.
Impacts on the socioeconomic infrastructure.
Impacts resulting from increased vessel traffic.
Proper enforcement of existing regulations.
Environmental data gaps in Cook Inlet.
Water quality, i.e., discharge of muds and cuttings.
Impacts of a lengthy pipeline under Cook Inlet.

Suggested Mitigating Measures:

Deletion of all blocks north of a line composed of blocks 266 through 276, as listed on protraction diagram no. 5-2.
Hypothetical facility sites used in this document should comply with and be coordinated with any borough coastal zone management program.

In light of the low turnout at Homer, it was decided to send letters to each of the attendees to request additional information and to urge them to ask their constituencies to contact the Alaska OCS Office in writing and register their concerns. As a result of our requests, radio station KBBI broadcast public service messages telling their listeners that we wanted to hear from them, the Homer News published a January 10 article informing their readers of our desires for additional input, and finally, in their January Newsletter, the Kachemak Bay Conservation Society requested their members to contact the BLM/OCS Office and indicate their concerns. As a result of these efforts the BLM/OCS Office received two letters. One letter was received from Mayor Gilman and one letter from Ms. Joy Post of Homer. The issues which were outlined in the letters will be summarized at the end of this section with the rest of the written comments.

Three scoping meetings were held which involved State and Federal personnel. The first meeting was held in Anchorage on May 14, 1979. The meeting was a combined sales 46 and 60 effort; it drew eight people. The attendees represented the National Oceanic and Atmospheric Administration (NOAA), the National Marine Fisheries Service (NMFS), the Heritage Conservation and Recreation Service (HCRS), the Fish and Wildlife Service (FWS), the Geological Survey (USGS), and the Alaska Department of Fish and Game (ADF&G). The results are as follows.

Issues Surfaced:

Impacts on the socioeconomic environment which would result from the development phase of OCS activity.

Proceed with the proposal.
The importance of assessing and including viable mitigating measures within the EIS including pipeline, cultural, resource, and orientation program stipulations.
Onshore impacts on the biological environment.
The adequate treatment of environmental constraints on offshore oil and gas operations.

The second meeting took place in Juneau on May 19th, 1979. This meeting was supposed to be a combined sales 46 and 60 scoping session. The Juneau meeting was not well attended. Representatives of the Coast Guard and one employee of the Alaska Department of Health and Social Services attended. No issues of significance were surfaced.

The third Federal scoping meeting took place on February 1, 1980. The meeting involved the in-house BLM/OCS staff. The results of the scoping activities were analyzed during this gathering. As a consequence of the meeting, alternative VI was added to the DEIS and the issue of subsistence was elevated as a topic of concern.

On March 5, 1980, a final scoping meeting was held in Kodiak. The purpose of the gathering was to receive the comments of members of the Kodiak Area Native Association, Overall Economic Development Committee. This committee represents the Native villages of Kodiak Island. The results of the meeting are as follows.

Issues Surfaced:
Impacts to subsistence activities.
Impacts to commercial fisheries.
Cumulative effects of sales 46 and 60.
Impact of proposed sale 60 on the delivery of services to the villages.
Impacts on endangered species and marine mammals.
Limiting access by oil and gas workers to Native villages.

Suggested Mitigating Measures:
Orientation program for all oil and gas workers.
Any oil and/or gas terminal should be set apart in an enclave similar to the enclave created outside Yakutat following OCS sale 39.

As a result of scoping activities, the Alaska OCS Office received a total of nine written comments from the following organizations and individuals: Department of the Interior; Bureau of Land Management, Alaska State Director; Assistant Conservation Manager, Alaska Area U.S. Geological Survey; Heritage Conservation and Recreation Service; Department of Energy; Coast Guard; Kenai Peninsula Fishermen's Cooperative Association; Mayor Don Gilman of the Kenai Peninsula Borough; Mayor George Sullivan of Anchorage; and Ms. Joy Post of Homer.

Their suggestions for further focus in the DEIS included discussion of:
Impacts on all commercial crab species.
Impacts on bottomfish and the bottomfish industry.
Impacts on the salmon fisheries, specifically the drift net salmon fisheries.
Economic impacts occurring onshore to the fisheries industry.

Impacts on marine mammals and endangered species.
Impacts on recreation, tourism, and wilderness values.
Impacts on land use.
Impacts on cultural resources.
Impacts on the marine transportation systems.
Likelihood and severity of pollution events.
Impacts on subsistence activities and lifestyle.
Impacts on social services and socioeconomics, in general.
Seismic hazards within the sale area.

It should be noted that all organizations, government agencies, and individuals listed in the foreword of this FEIS were invited to attend the various scoping meetings and/or submit their written comments.

The results of these meetings and the issues raised in the written comments were analyzed by the EIS team during the early months of 1980. Concerns raised during the scoping efforts conducted for the now cancelled sale 46 were also considered. The following major issues and alternatives were determined from this analysis. They are the principal foci around which this EIS developed (CEQ regulations 40 CFR 1501.7).

Major Issues Surfaced:

1. Impacts on commercial fish and the commercial fishing industry.
2. Cumulative effects impacts.
3. Impacts on land use and coastal zone management.
4. Local socioeconomic impacts.
5. Marine transportation impacts.
6. Environmental data gaps.
7. Impacts on subsistence activities.
8. Impacts on water quality.
9. Geological hazards.
10. Marine Mammals.
11. Endangered Species.

Alternatives:

The proposal as stated: lease all 153 blocks.

Deletion of all blocks south of block 1055. This action would result in deletion of all 81 blocks within Shelikof Strait (alternative V). Alternative IV is a modification of this option.

Deletion of all blocks north of a line from block 266 through block 276. Such an action would result in the deletion of 19 blocks all within the lower Cook Inlet. This option has been included in alternatives IV and V.

The inclusion of a Shelikof Strait-only option. This alternative would result in the deletion of 86 blocks contained in the lower Cook Inlet and would limit saleable blocks to Shelikof Strait. The Shelikof Strait-only option is represented in this EIS as alternative VI.

The focus of this FEIS is in keeping with the objectives of the CEQ regulations (40 CFR 1500). The objectives are to produce a more precise, easily understandable document which can function more effectively as a decisionmaking tool. In order to accomplish this task, major issues surfaced during the scoping process receive the greatest share of analysis within this document; secondary issues are treated less extensively.

II. ALTERNATIVES INCLUDING PROPOSED ACTION

This section describes the proposed action and each alternative to the proposed action. It also outlines the various production assumptions, development scenarios, resource estimates, and mitigating measures which shape the environmental analysis contained within this document. Finally, this section includes a summary of probable impacts of the proposed action and each of its alternatives.

A. Resource Estimates and Production Assumptions

Undiscovered recoverable resources are those quantities of oil and gas which are reasonably expected to exist in favorable geologic settings, and which after discovery, can reasonably be expected to be produced with present technology and economic conditions. If exploration confirms the existence of recoverable oil and gas, such resources are reclassified as reserves.

The resource estimates used in this EIS assume that favorable geologic conditions exist so that oil and gas are present and are contained in traps within the proposed lease area in commercial quantities. However, there is a 95 percent probability that no commercial resources will be discovered or a 5 percent chance that commercial resources will be found within the proposed lease sale area. This degree of risk is applicable to all alternatives discussed within this EIS. The proposed lease area is, therefore, considered to be a high risk area in terms of discovering commercial oil or gas. This risk factor is subject to modification as more is learned about the area. Any citation of this unrisked resource data should clearly state that the information assumes discovery. Estimates of resource potential are inherently speculative, particularly in areas where geologic information is limited and the presence of oil and gas has not been demonstrated.

The method used to develop the resource estimates involved an analysis of geophysical and geologic information on subsurface and adjacent surface formations. This information became the input to engineering and economic calculations to determine minimum commercial field sizes. These minimum field sizes, plus the hydrocarbon structure information were statistically blended in a model using a Monte Carlo (random) technique to produce the proposed lease area's commercial resource distribution curve. Then, assuming that commercial resources were found, the minimum case, the mean case, and the maximum case were then rerun using a Monte Carlo technique to determine production factors such as number of wells and reservoir decline patterns.

The resource estimates include primary production only; no assumption has been made regarding secondary recovery. Improvement of drilling technology and exploration science might increase the estimates. Differing assumptions regarding exploration and development costs, operating expenses, the price and market for oil and natural gas, taxes, depreciation, and royalty and production rates would affect the estimates of the recoverable resources. Similarly, a significant change in one or several of these factors in the future could affect the amount of resources actually recovered.

The Geological Survey has estimated the maximum resource (5%) level, the mean, and the minimum resource (95%) level of recoverable oil and natural gas resources within the proposed lease area as follows:

	Maximum	Mean	Miminum
Oil (MMbbls)	1,015	670	332
Natural Gas (Bcf)	1,776	1,173	581

The indicated resources are based upon unrisked statistical resource estimates, or the 5-percent probability that commercially recoverable resources are discovered.

Information exists for a reasonable resource for each alternative. Accordingly, the environmental analysis of each alternative is based on the assumption that resource development would result in the following production estimates:

	Alt. IV	Alt. V	Alt. VI
Oil (MMbbls)	260	180	335
Natural Gas (Bcf)	456	316	-0-

Alternative I is represented by the mean resource level of the proposed action. Alternative II is the no sale case. Alternative III portrays a situation in which the sale of the blocks in question is delayed 2 years. Resource estimates indicated for alternatives IV, V, and VI are all variations of the mean level resource estimate.

For the development scenario of the proposed action, crude oil produced in lower Cook Inlet is hypothesized to be transported via pipeline to an oil storage and tanker loading terminal constructed at a point between Anchor Point and Stariski Creek. Crude oil extracted from the Shelikof Strait is hypothesized to be transported by pipeline to an oil storage and tanker loading terminal located near Talnik Point on the shore of Marmot Bay. Natural gas produced in both the Shelikof Strait and the Cook Inlet would be piped to a gas compressor station located on or near the Anchor Point terminal. From Anchor Point, the gas would be transported via pipeline to Nikiski where it would be liquefied at the present Phillips or proposed Pacific LNG plant and then transported to market on the west coast. The transported LNG would most likely undergo regasification at Point Conception, California. On September 26, 1979, the Federal Energy Regulatory Commission (FERC) conditionally approved construction of an LNG facility at Point Conception. This facility will receive LNG shipments from both Indonesia and Cook Inlet. The Point Conception facility will eventually vaporize LNG at an average plant output of 900 MMcfd with an additional peaking capacity of 300 MMcfd. Any expansion of the presently planned operating capacities of either the proposed Pacific or Point Conception LNG facility would be subject to review by the Federal Energy Regulatory Commission.

In regard to alternatives IV and V, all oil and gas produced would be transported by pipeline to Anchor Point and Nikiski, respectively. No facilities construction is hypothesized for any portion of the Kodiak Archipelago for either alternative IV or V. Alternative VI would require all extracted oil to be transported by pipeline to a tanker loading terminal near Talnik Point; gas would not be economically recoverable and would be reinjected into the formation.

The lower Cook Inlet scenario of the proposed action represents just one option by which the resources extracted as a result of sale 60 could be processed. The purpose of the development scenarios included in this EIS is to provide a reasonable framework within which the possible impacts of oil and gas activities may be judged. Given the projected decline of oil and gas production in upper Cook Inlet, excess refining and storage capacity at existing facilities could increase to the point so that resources produced from lower Cook Inlet could be processed at these facilities.

No facilities exist on either Kodiak or Afognak Island to handle hydrocarbons produced from the Shelikof Strait. In regard to industry, the islands are largely undeveloped. Several facility sites have been identified as being physically adequate (excluding biological considerations) for development (fig. II.A.-1). The location and construction of a pipeline to an oil storage terminal near Talnik Point is just one of several options. The option selected was chosen for a variety of reasons, probably the most important being its gulf coast location which would allow tankers to operate without entering Shelikof Strait. Favorable features of the site are the depth of adjacent waters, the existence of source rock for breakwater construction, land with slopes suitable for development, and an airport that could be enlarged to support offshore operations. For a review of potential development sites for hydrocarbons produced in the Shelikof Strait see, "Oil Terminal and Marine Service Base Sites in the Kodiak Island Borough," Woodward and Clyde Consultants, 1977, Anchorage, Alaska; and "Lower Cook Inlet/Shelikof Strait Petroleum Development Scenarios, "Technical Report No. 43," prepared by Dames and Moore for the BLM Alaska OCS Office, 1980, Anchorage, Alaska.

Figure II.A.-1 shows some of the other sites which appear to be physically capable of hosting facilities. Conceivably, none of the sites may be used if other factors (community resistance, land use policies, restrictive zoning, etc.) limit or cause industry disinterest in these sites, and if other physically capable sites are made more attractive. Because of the many assumptions involved, this analysis is not intended as, nor should it be used as, "a local planning document" by potentially affected communities, nor is it a forecast or prediction of the future. All facility locations/scenarios described in this EIS are intended to represent only a few plausible locations/scenarios that presently seem likely. They serve only as a basis for identifying characteristic activities and resulting impacts for this EIS and do not represent a BLM recommendation, preference, or endorsement of facility sites or development schemes.

B. Analysis of Proposal and Alternatives

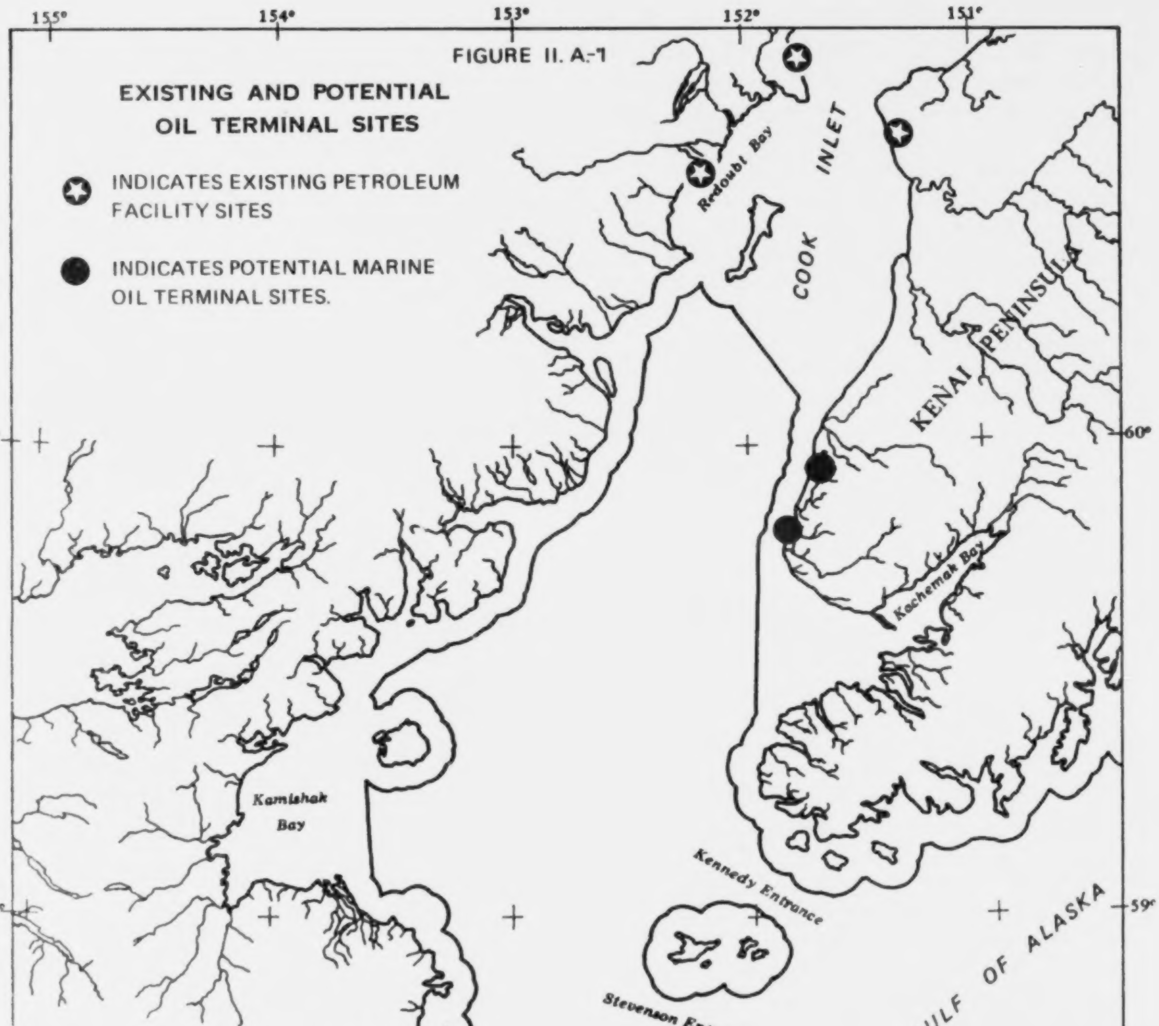
1. Alternative I (Proposal):

a. Description of the Proposal: This proposal involves the possibility of leasing 153 blocks in lower Cook Inlet and the northern portion of Shelikof Strait (fig. II.B.1.a.-1). Each block is approximately 3 square miles. These blocks cover an area of approximately 349917 hectares (864,646 acres), and are located from 5 to 37 kilometers (3 to 23 mi) offshore in water depths that range from 15 to 210 meters (49 to 689 ft). A summary of these blocks by water depth and distance to shore is in appendix J of this FEIS.

In November of 1979, the U.S Geological Survey estimated that, based on geophysical data, the 153 blocks offered for lease by this proposal may contain undiscovered recoverable resources ranging from 332 to 1,015 MMbbls of oil and from 581 to 1,776 Bcf of natural gas. Based on these estimates, the proposed action may result in a peak daily production of between 151,500 and 342,200 barrels of oil, and between 265.2 and 598.9 MMcf of gas per day.

FIGURE II. A-1

EXISTING AND POTENTIAL OIL TERMINAL SITES


✪ INDICATES EXISTING PETROLEUM FACILITY SITES
● INDICATES POTENTIAL MARINE OIL TERMINAL SITES.
155°
154°
153°
152°
151°
60°
59°
58°
Redoubt Bay
COOK INLET
KENAI PENINSULA
Kachemak Bay
Kamishak Bay
Kennedy Entrance
Stevenson Entrance
GULF OF ALASKA
ALASKA PENINSULA
Perenosa Bay
AFOGNAK ISLAND
STRAIT
SHELIKOF
Marmot Bay
KODIAK ISLAND

Source: Woodward & Clyde 1977
Dames & Moore 1979
Ch2M Hill 1978
BLM / OCS 1980

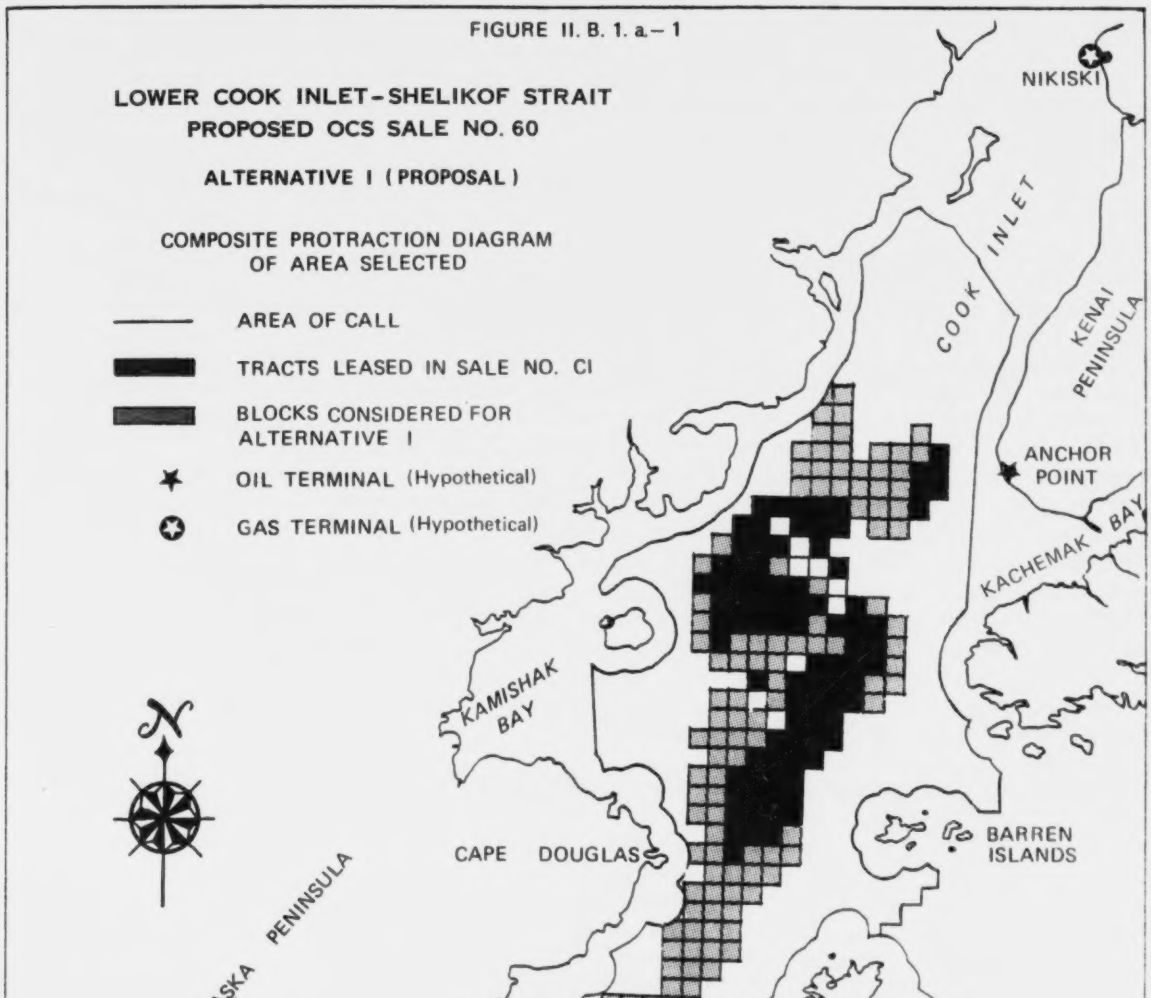


FIGURE II. B. 1. a.– 1

LOWER COOK INLET–SHELIKOF STRAIT
PROPOSED OCS SALE NO. 60

ALTERNATIVE I (PROPOSAL)

COMPOSITE PROTRACTION DIAGRAM
OF AREA SELECTED

AREA OF CALL
TRACTS LEASED IN SALE NO. CI
BLOCKS CONSIDERED FOR ALTERNATIVE I
OIL TERMINAL (Hypothetical)
GAS TERMINAL (Hypothetical)
N
NIKISKI
COOK INLET
KENAI PENINSULA
ANCHOR POINT
KACHEMAK BAY
KAMISHAK BAY
CAPE DOUGLAS
BARREN ISLANDS
ALASKA PENINSULA
AFOGNAK ISLAND
SHELIKOF STRAIT
TALNIK POINT
GULF OF ALASKA
CHINIAK BAY
KODIAK ISLAND
CAPE CHINIAK
CAPE IKOLIK

Source: Alaska Outer Continental Shelf Office 1980

Basic Development Assumptions: Environmental, social, and economic impacts may occur as a result of a Federal decision to permit exploration for a commercially producible offshore gas field. Estimated levels of oil and gas discovered are a prime determinant in estimating the amount of activity and impact caused by such a decision.

This EIS is based on the 5-percent probability that commercial quantities of hydrocarbons will be found. Further, discussion of oil and gas development activity centers on the more probable intermediate level of assumed resource discovery (the mean case) rather than the more extreme minimum or maximum cases. The minimum and maximum cases are discussed in appendices A and B.

Estimated Activity Resulting from the Proposal: The amount of commercial activity that may be generated in Cook Inlet and Shelikof Strait is dependent on many variables. Chief among these would be the amount of recoverable resources; however, also of great importance would be the availability of capital, work force, equipment, and the willingness of regional and local authorities to work with industry in the implementation of development programs. The quantity of recoverable resources (oil and natural gas) is presently unproven and, therefore, is presented in three levels (minimum, mean, maximum) in order to show an estimated range of resource potential. This range of resource potential has been discussed briefly in section II.A. A detailed description of development scenarios and schedules of investment and production in appendix A. The following discussion will assume a degree of activity which might be associated with a mean level discovery of hydrocarbons (see resource estimates previous pages).

Estimated Activity Based on the Mean Scenario: Should the sale be held, exploration would likely begin in 1982 and continue through 1986 with a total of 16 exploration and delineation wells drilled. No more than three rigs would be assumed to be working during any one year of the exploratory period. Drilling during the exploratory phase would be carried out by semi-submersibles; however, jack-up rigs could be used in selected locations of shallow water depths of about 61 meters (200 ft) or less.

Primary maritime support and supply activities would occur from existing hydrocarbon industry facilities located at Nikiski. Aircraft support would be launched from fields located on the Kenai Peninsula in Port Lions, the city of Kodiak and, possibly, at Cape Chiniak.

For the proposal (alternative I), it is assumed a total of 640 kilometers (400 mi) of pipeline would be constructed. This mileage would be divided between two separate oil pipelines and one gas pipeline. One oil pipeline system would drain the lower Cook Inlet, would total about 128 kilometers (80 mi), and would be emplaced entirely under water. It would terminate in an oil storage terminal located between Stariski Creek and Anchor Point on the Kenai Peninsula. The second oil pipeline would service Shelikof Strait. It could be constructed through Kupreanof Strait to Chernof Point, and then overland to the vicinity of Talnik Point. A Talnik Point facility would be exposed to northern weather and would require a protective breakwater. Oil tankers enroute to a Talnik Point facility would arrive from the Gulf of Alaska via Marmot Bay. Total length of the Talnik Point pipeline could be about 144 kilometers (90 mi), with 16 kilometer (10 mi) of the total allotted for overland passage. The gas pipeline would traverse both the Shelikof Strait and Cook Inlet. It could landfall at or near the Stariski/Anchor Point oil terminal. The gas could then be pumped by a compressor station through a 70-mile overland pipeline system to Nikiski. At Nikiski the gas would be liquefied and transported to market. Total length of the gas pipeline would be approximately 368 kilometers (230 mi).

Pipeline diameters assumed for the mean case of the proposal would be 22 inches for oil, and 18 inches for gas. Pipeline construction could begin in 1984 and finish during 1986. Standard pipe lay barges can operate in wave heights up to 1.5 meters (5 ft). As the weather throughout the proposed sale area is generally inclement and wave heights may exceed 1.5 meters, it is possible that larger lay barges, such as the "Viking Piper," could be used in order to minimize downtime.

Nikiski currently hosts the Phillips LNG plant. The Phillips facility is capable of processing 185 MMcf of natural gas per day. By 1982, a second LNG facility (operated by Pacific Alaska LNG Associates) will be constructed adjacent to the Phillips plant. Total processing capacity for the new plant will be 400 MMcf per day. Taken together, the combined refining capacity of the two plants should be sufficient to process any LNG produced from the Cook Inlet and Shelikof Strait.

Oil and gas production could begin by 1986. By that year, it is hypothesized that four pile-supported steel tower production platforms would be installed. By 1991, some 195 production wells could have been drilled. It is assumed that oil would be produced until 2011. Natural gas production would cease in 2012. The total life of the field is estimated at 26 years.

A summary of activities required to develop the estimated mean resources is on table II.B.1.a.-1.

b. Mitigating Measures that are Part of the Proposed Action: Any laws, regulations, or orders that provide mitigation are considered part of the proposal. Some examples are the OCS Operating Orders, coastal zone management regulations, the Fishermen's Contingency Fund, and the Offshore Oil Pollution Control Fund. Appendices O and P contain brief descriptions of some of these laws, regulations, and orders.

Protection of Cultural Resources: This measure was used in the analysis and considered part of the proposal.

Background: In the past, there has been agreement that prelease cultural resources probability studies would be conducted as a basis of information for BLM to request invocation of this stipulation by the DCM. The Alaska OCS Office has sponsored these studies for the Cook Inlet/Shelikof Strait area. As a result of field level interbureau coordination meetings held on November 14, 18, and 26, and December 4, 1980, this measure was revised from the measure which appears in the DEIS. At a Washington level interbureau coordination meeting held on January 30, 1981, consensus was reached to use the wording that appears in the DEIS.

Stipulation: If the DCM, having reason to believe that a site, structure, or object of historical or archeological significance,

Table II.B.1.a.-1
Summary of Activities Required to Develop the Estimated Resources Within the Proposed Action Mean Case (Alternative I)

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1. Estimated acreage, construction activity, and resources:
   a. Sale Acreage Offering: 350182 hectares (864,646 acres)
   b. Exploration and Delineations Wells: 16
   C. Production Platforms: 4
   d. Production Wells: 195
   e. Workover Wells: 624
   f. Pipelines:

	Oil (22" diameter)	Gas (18" diameter)
Offshore length:	129 km (80 mi to Anchor Point) 129 km (80 mi to Chernof Point)	225 km (160 mi to Anchor Point)
Onshore length:	0 16 km (10 mi to Talnik Point)	113 km (70 mi to Nikiski)

g. Terminal(s):

Oil: 2 (Anchor Point and Talnik Point)
Gas: Use existing terminal(s) at Niskiski.

h. Recoverable Hydrocarbons:

	Oil	Gas
Total Production:	670.0 MMbbls	1,173.0 Bcf
Peak Production:	265.2 Mbbls/D	464.4 MMcf/D
Average Annual Production:	26.8 MMbbls	45.1 Bcf

2. Estimated peak annual transportation by tanker:
   Oil: 96.8 MMbbls
   LNG: 50 MMbbls

3. Estimated tonnage (2,000 lbs/ton) of commercial muds and volume of drill cuttings (assuming 16 exploration wells at 4864 meters (16,000 ft) and 195 production wells at 3040 meters (10,000 ft):

Exploration/Production

	Exploratory Period		Production Period	
	Per Well	Total Field	Per Well	Total Field
Muds:	947 metric tons (1,044 tons)	15,152 metric tons (16,704 tons)	680 metric tons (750 tons)	15,708 metric t (17,278 tons)
Cuttings:	539m^3 (704 yd^3)	8,624m^3 (11,264 yd^3)	206m^3 (269 yd^3)	40,170m^3 (52,455 yd^3)

* Please note that during the production and development period drill mud is reused. Approximately 10 percent of the total drill mud used is lost downhole.

4. Estimated volume of formation water produced:
A prediction cannot be made at this time due to incomplete knowledge of the subsurface geology of the Shelikof Strait. However, based upon the behavior of the upper Cook Inlet field we may hypothesize that at midlife the sale 60 field will be producing one barrel of formation water for every two barrels of oil. This figure would equal some 12-15 MMbbls per year.

5. Estimated land use requirements for onshore facilities:

Support/Supply: Existing facilities will suffice.

	Oil	Gas
Terminal(s) and related facilities:	2 terminals (49 hectares/120 acres each)	1 compressor station (16 hectares/40 acres)

6. Estimated burial disturbance of offshore pipeline (assuming 2734 m^3/km (5,750 yd^3/mi) for oil pipeline and 2377 m^3/km (5,000 yd^3/mi) for gas pipeline) will be:

Oil: 352686 m^3 (460,000 yd^3) each to
Anchor Point and Chernof Point

Gas: 534825 m^3 (700,000 yd^3)

hereinafter referred to as a "cultural resource," may exist in the lease area, gives the lessee written notice that the lessor is invoking the provisions of this stipulation, the lessee shall, upon receipt of such notice, comply with the following requirements:

Prior to any drilling activity or the construction or placement of any structure for exploration or development on the lease, including, but not limited to, well drilling and pipeline or platform placement, hereinafter in this stipulation referred to as "operation," the lessee shall conduct remote sensing surveys to determine the potential existence of any cultural resource that may be affected by such operations. All data produced by such remote sensing surveys, as well as other pertinent natural and cultural environmental data, shall be examined by a qualified marine survey archeologist to determine if indications are present suggesting the existence of a cultural resource that may be adversely affected by any lease operation. A report of this survey and assessment prepared by the marine survey archeologist shall be submitted by the lessee to the DCM and the Manager, Bureau of Land Management Alaska Outer Continental Shelf Office, for review.

If such cultural resource indicators are present, the lessee shall (1) locate the site of such operation so as not to adversely affect the identified location; or (2) establish, to the satisfaction of the DCM, on the basis of further archeological investigation conducted by a qualified marine survey archeologist or underwater archeologist using such survey equipment and techniques as deemed necessary by the DCM, either that such operation shall not adversely affect the location identified or that the potential cultural resource suggested by the occurrence of the indicators does not exist.

A report of this investigation prepared by the marine survey archeologist or underwater archeologist shall be submitted to the DCM and the Manager, BLM Alaska OCS Office, for their review. Should the DCM determine that the existence of a cultural resource which may be adversely affected by such operation is sufficiently established to warrant protection, the lessee shall take no action that may result in an adverse effect on such cultural resource until the DCM has given directions as to its preservation.

The lessee agrees that if a site, structure, or object of historical or archeological significance should be discovered during the conduct of any operations on the lease area, he shall report immediately such findings to the DCM and make every reasonable effort to preserve and protect the cultural resource from damage until the DCM has given directions as to its preservation.

Evaluation of Effectiveness: BLM has sponsored studies in lower Cook Inlet and Shelikof Strait to evaluate the potential of cultural resources in the area. The lessee or agent, during any activities on the leasehold, is required to report any findings to the Supervisor in the event any site or object of historic or archaeologic significance should be discovered. The contractor is also required to make every reasonable effort to preserve and protect such site or object from damage until the DCM makes a determination on an appropriate course of action.

Through the imposition of this stipulation and compliance with applicable Federal and State laws regarding cultural resources, and adherence with rules, regulations, policies of the Alaska Coastal Management Program, the Kenai Peninsula Borough District Program, when approved, and the Intergovernmental Planning Program for OCS Oil and Gas Leasing, Transportation, and Related Facilities, the protection and preservation of cultural resources is assured.

There was agreement to adopt this measure at the Washington level interbureau coordination meeting held on January 30, 1981.

c. Potential Sale-Specific Mitigating Measures: Because formal acceptance of the following measures has not occurred, they are noted here only as possibilities that could be utilized. The analysis in this FEIS is not based on these measures; they are not part of the proposal.

Field level interbureau coordination meetings were held on November 14, 18, and 26, and on December 4, 1980. Mitigating measures which appear in the DEIS for this proposed sale were discussed and evaluated. Further discussion and refinement of these measures occurred at a Washington level interbureau coordination meeting held on January 30, 1981.

Potential Mitigating Measure No. 1 - Well and Pipeline Requirements:

Background: This measure was previously accepted for OCS sales 42, 48, and 55. The intent is to mitigate potential damage to fishing gear by marine vessel traffic through pipeline design. The intent is also to mitigate cumulative effects of various projects in the area (sec. IV.A.1.h.).

> Subsea Wellhead Measure: Subsea wellheads and temporary abandonments, or suspended operations that leave protrusions above the seafloor shall be protected, if feasible, in such a manner as to allow commercial fishing trawl gear to pass over the structure without snagging or otherwise damaging the structures or the fishing gear. Latitude and longitude coordinates of these structures, along with water depths, shall be submitted to the DCM (Deputy Conservation Manager, Field Operations, Alaska Region, USGS). The coordinates of such structures will be determined by the lessee utilizing state-of-the-art navigation systems with accuracy of at least ± 50 feet (15.25 m) at 200 miles (322 km).
>
> Pipeline Design Measure: All pipelines, unless buried, including gathering lines, shall have a smooth-surface design. In the event that an irregular pipe surface is unavoidable due to the need for valves, anodes, or other structures, it shall be protected in such a manner as to allow trawl gear to pass over the object without snagging or otherwise damaging the structure or the fishing gear.

Evaluation of Effectiveness: Although the wording of this mitigating measure has become standard, other existing measures, may adequately preclude the need for a special stipulation. As a result of a Washington level interbureau coordination meeting held on January 30, 1981, it was agreed that this measure be deleted for the following reasons:

Existing OCS Orders 1 and 3 require that all subsea objects hazardous to navigation or commercial fishing be marked by navaids as directed by the U.S. Coast Guard. OCS Order No. 3 requires that all casing, wellheads, and pilings, when abandoned, must be removed to a minimum depth of 5 meters (16 ft) below the ocean floor; and that temporary abandonments must be identified and marked, as directed by the Coast Guard, when a casing stub extends above the ocean floor.

U.S. Coast Guard regulations provide for marking and protection of subsea objects. Obstructions must be accurately reported and the location published in a public notice. The U.S. Coast Guard has regulations, 30 CFR 147 (Federal Register, May 1, 1980), which establish "safety zones" around OCS objects in other OCS areas.

Rights-of-way are subject to environmental safety assurance through regulations requiring best available and safest technology (BAST) and regulatory and CZM consistency reviews (OCS Lands Act, Section 5(e), as amended).

Potential Mitigating Measure No. 2 - Transportation of Hydrocarbon Products:

Background: The following measure was accepted for OCS sales 42, 48, and 55 (open ocean areas). The intent of the stipulation is to protect pipelines from damage by climatic, geologic, or human factors, and from various traffic and projects to an area. In response to a suggestion by the State of Alaska, the Port and Tanker Safety Act of 1978 (33 U.S.C. 1221), has been cited in the last sentence of the last paragraph of this measure.

> Pipeline Requirement Measure: Pipelines will be required a) if pipeline right-of-way can be determined and obtained; b) if laying such pipelines is technically feasible and environmentally preferable; and c) if, in the opinion of the lessor, pipelines can be laid without net social loss, taking into account any incremental costs of pipelines over alternative methods of transportation and any incremental benefits in the form of increased environmental protection or reduced multiple-use conflicts. The lessor specifically reserves the right to require that any pipeline used for transportation production to shore be placed in certain designated management areas. In selecting the means of transportation, consideration will be given to any recommendation of the intergovernmental planning program for assessment and management of transportation of Outer Continental Shelf oil and gas with participation of Federal, State, and local government and industry.
>
> All pipelines, including both flow lines and gathering lines for oil and gas, shall be designed and constructed to provide for adequate protection from water currents, storms, geohazards, fisheries trawling gear, and other hazards as determined on a case-by-case basis.
>
> Following the development of sufficient pipeline capacity, no crude oil will be transported by surface vessel from offshore production sites, except in the case of emergency. Determinations as to emergency conditions and appropriate responses to these conditions will

be made by the DCM (Deputy Conservation Manager, Field Operations, Alaska Region, USGS).

Where the three criteria set forth in the first sentence of this stipulation are not met and surface transportation must be employed, all vessels used for carrying hydrocarbons to shore from the leased area will conform with all standards established for such vessels, pursuant to the Ports and Waterways Safety Act (46 U.S.C. 391a) and the Port and Tanker Safety Act of 1978 (33 U.S.C 1221).

Evaluation of Effectiveness: The intent of this measure is to transport hydrocarbons by the safest and environmentally preferable method. The measure has been standard for most lease sales, but has not yet been implemented on the Alaska OCS since there has been no commercial discovery of oil or gas on the Alaska OCS.

The measure also recognizes and takes into account the Intergovernmental Planning Program (IPP) whose recommendations take into account local land use planning, coastal management, environmental data gaps, local socioeconomic conditions, transportation, routing and planning. This measure takes into account the vulnerable coastline surrounding lower Cook Inlet and Shelikof Strait. Although this stipulation requires pipelines, it allows the flexibility for alternative methods of transportation of hydrocarbons from the lease area as long as such modes of transportation do not pose additional unacceptable risks to the human, marine, and coastal environments. The proposed stipulation is consistent with the stipulation in Cook Inlet lease area (sale CI).

Some minor word changes were made at the Washington level interbureau coordination meeting held on January 30, 1981, and agreement was reached to adopt this measure.

Potential Mitigating Measure No. 3 - Environmental Training Program:

Background: Uninformed workers and subcontractors could unknowingly destroy or damage the environment, or be insensitive to local historical or cultural values, as well as biological resources. Due to the importance of fisheries, subsistence, economics, and vessel operations in the Cook Inlet/Shelikof Strait area, these issues would be covered in the orientation program. These subjects have been identified in the scoping process as a major concern.

This stipulation has the potential to provide an increased measure of protection to the environment and addresses concerns of local residents. This program was implemented for the Trans-Alaska Pipeline and in the lower Cook Inlet OCS lease sale. The wording of this mitigating measure was used for the lower Cook Inlet sale. Wording has been added to paragraph two in response to comments on the DEIS submitted by the State of Alaska.

Training Requirement Measure: The lessee shall include in any exploration and development plans submitted under 30 CFR 250.34 a proposed environmental training program for all personnel involved in exploration or development activities (including personnel of the lessee's contractors and subcontractors) for review and approval by the DCM (Deputy Conservation Manager, Field Operations, Alaska Region, USGS). The program shall be designed to inform each person working on the project of specific types of environmental, social, and cultural concerns which relate to the individual's job. The program shall be formulated by qualified instructors experienced in each pertinent field of study, and shall employ effective methods to ensure that personnel are informed of archeological, geological, and biological resources, to include bird and sea mammal rookeries, to identify the importance of avoidance and nonharassment of wildlife resources.

The program shall also be designed to increase the sensitivity and understanding of personnel to community values, customs, and lifestyles in areas in which such personnel will be operating and shall include information concerning avoidance of conflicts with commercial fishing operations and with commercial fishing gear.

The lessee shall also provide for review and approval a continuing technical environmental briefing program for supervisory and managerial personnel of the lessee and its agents, contractors, and subcontractors.

Evaluation of Effectiveness: This mitigating measure was chosen over a similar one used in the offshore area near Massachusetts. This measure was felt to be more applicable than the sale 42 (Georges Bank) measure which focusses on fisheries.

Although this measure provides no direct prohibitions of activities which may have cultural or social impacts on the area, it provides a positive mitigating effect by making workers aware of the unique environmental, social, and cultural values of the local residents and their environment. This orientation program would promote an understanding of and appreciation for local community values, customs, and lifestyles of Alaskans without creating undue economic costs to the lessee. It would also provide necessary information to personnel which could result in minimized behavioral disturbance to wildlife, and avoidance of conflicts with commercial fishermen.

Agreement was reached at the Washington level interbureau coordination meeting on January 30, 1981, to adopt this measure.

Potential Mitigating Measure No. 4 - Protection of Biological Resources:

Background: Variants of this measure have been accepted in various OCS areas. It provides a mechanism for defining important biological populations and the effects drilling operations may have on the biota. The measure may fill some data gaps and thereby assist the DCM in making specific recommendations on the location of a drilling vessel.

Biological Protection Measure: If the DCM, having reason to believe that significant biological populations or habitats requiring additional protection may exist within the lease area, gives the lessee written notice that the lessor is invoking the provisions of this stipulation, the lessee shall, upon receipt of such notice, comply with the following requirements:

Prior to the commencement of any drilling activity or construction or placement of any structure for exploration or development activity, the lessee shall conduct site-specific environmental surveys or studies, including sampling as approved by the DCM, to characterize existing environmental conditions in an indentified zone prior to oil and gas operations, and to determine the extent and composition of biological populations or habitats, and the effects of proposed operations on the populations or habitats which might require additional protective measures. The nature and extent of any such surveys or studies will be determined by the DCM on a case-by-case basis.

Based on any surveys or studies which the DCM may require of the lessee, the DCM may require the lessee to: 1) relocate the site of operations so as not to affect adversely the significant biological populations or habitats deserving protection; 2) modify operations in such a way as not to affect adversely the significant biological populations or habitats deserving protection; or 3) establish to the satisfaction of the DCM that such operations will not adversely affect the significant biological populations or habitats deserving protection. Based on any surveys or studies which the Supervisor may also require of the lessee, the DCM may require the lessee to provide for periodic sampling of environmental conditions during operations.

The lessee shall submit all data obtained in the course of such surveys or studies to the DCM, with the locational information for drilling or other activity. The lessee may take no action that might result in any effect on the biological populations or habitats surveyed, until the DCM provides written directions to the lessee with regard to permissible actions.

In the event that important biological populations or habitats are identified subsequent to commencement of operations, the lessee shall make every reasonable effort to preserve and protect all biological populations and habitats within the lease area, until the DCM provides written instructions to the lessee with regard to the biological populations or habitats identified.

Evaluation of Effectiveness: Biological surveys in connection with lease requirements and COST wells in the Gulf of Alaska, lower Cook Inlet, Kodiak, St. George Basin, and Norton Sound have not resulted in any significant, new, or unexpected biological information which required any well relocations or changes in normal operating procedures.

Exploration plans are reviewed by various agencies who could recommend a survey be put forth. Surveys could be enforced during production and development and during exploration studies. For example, in the Beaufort Sea lease area, the BLM Studies Program (sec. III.G.) showed that specific areas of biological sensitivity can be surveyed through stipulation. Shelikof Strait may be an area of particular concern.

Agreement was reached, at a Washington level interbureau coordination meeting (January 30, 1981), to adopt this measure.

d. Possible Information to Lessee: Information to lessee provides notice to operators of special concerns in or near a lease area. The following were considered and accepted at field and Washington level interbureau coordination meetings.

> Information on Bird and Mammal Protection: Bidders are advised that during the conduct of all activities related to leases issued as a result of this lease sale, the lessee and it's agents, contractors, and subcontractors will be subject to the provisions of the Marine Mammal Protection Act of 1972, the Endangered Species Act of 1973, as amended, and International Treaties. Violations under these Acts and Treaties may be reported to the National Marine Fisheries Service or Fish and Wildlife Service, as appropriate.
>
> The lessee or his contractors should be aware that disturbance of wildlife could be determined to constitute harassment, and thereby be in violation of existing laws. Behavioral disturbance of most birds and mammals found in or near the sale 60 area would be unlikely if ocean vessels and aircraft maintained at least a 1-mile distance from observed wildlife or known wildlife concentration areas such as bird colonies or marine mammal rookeries. Therefore, in concurrence with the National Marine Fisheries Service and the U.S. Fish and Wildlife Service, it is recommended that aircraft or vessels operated by lessees maintain at least a 1-mile distance from observed wildlife or known wildlife concentration areas. Human safety will take precedence at all times over distances recommended herein for avoidance or disturbance of wildlife. Maps locating major wildlife concentration areas are available through the DCM and appropriate resource agencies.

Evaluation of Effectiveness: Conformance by lessees with the recommendations described above would help to insure that behavioral disturbance of wildlife, particularly at known concentration areas, would be minimized. Maps provided to the DCM will clearly designate locations habitually used as concentration areas. Tract-specific recommendations may be made by the DCM, as appropriate. Appropriate authorities may issue more specific regulations under existing legislation that could further minimize behavioral disturbance to wildlife.

Information Concerning Fairways: Some of the tracts offered for lease may fall in areas which may be included in fairways, precautionary zones or traffic separation schemes.

At the field level interbureau coordination meetings, a consensus was reached to modify the version of this measure that appears in the DEIS to reflect consideration of critical fishing areas. Wording is the same as that used in the Final Notice of Sale for OCS sale 55. At the Washington level interbureau coordination meeting held on January 30, 1981, agreement was reached to adopt this measure.

> Some of the tracts offered for lease may fall in areas which may be included in fairways, precautionary zones, or traffic separation schemes which may be established, among other reasons, for the purpose of protecting commercial fisheries. Bidders are advised that the United States

reserves the right to designate necessary fairways through lease tracts pursuant to the Port and Tanker Safety Act of 1978 (33 U.S.C. 1221).

e. Federal Grant Assistance: In addition to the protection of the human and ecological environments through the applicaton of the previously described USGS OCS operating orders, mitigating measures in place, and other potential sale-specific mitigating measures, the following discussion is offered to inform the affected communities of additional Federal assistance which may be available and which, if available, can act as a mitigation of sale impacts.

There are additional mitigating measures available to the Kenai Peninsula Borough and the Kodiak Island Borough. These take the form of planning assistance, because both the boroughs have planning and zoning capabilities as outlined in Title 29 of Alaska Statutes. Planning and zoning capabilities are by themselves mitigating measures.

Four Federal grant programs have had, and do have, funding available for land use planning. The first of these is Special Economic Development and Adjustment Assistance Program (known as title IX) of the Economic Development Administration. A title IX study was done by Kramer, Chin and Mayo, Inc. in 1978 for the Kodiak Island Borough, but present assumptions and scenarios are different in many cases. There is funding available for comprehensive community planning under the Department of Housing and Urban Development's 701 program. Funds from this program have not been used in recent years in the Kodiak Island Borough, but the borough has received other HUD moneys, such as block grants.

There are two grant programs under the Coastal Zone Management Act. The first under section 306 gives coastal states funds to plan for the allocation of land and water resources in their respective coastal zones. In Alaska, funding is available to organized coastal communities, via the State, to undertake this kind of planning. Section 308 provides for coastal energy impact program funding, available in the forms of grants, loans, and bond guarantees to provide up-front public services and facilities necessitated by energy development, and to mitigate the loss of environmental and recreational resources.

There are other assistance programs available for airports, roads, ports and harbors, water systems, sewage treatment plants, etc., on an individual basis.

f. Summary of Probable Impacts: The probability of an oilspill impacting significant ecological resources is considered in the impact analysis and is based on an oilspill risk model (USGS, 1980). Given an estimated amount of resource, and incorporating historic spill data, the model simulates the trajectories of oilspills from hypothesized spill points. It must be emphasized that the trajectories simulated by the model represent only hypothetical pathways of oil slicks and do not involve any direct consideration of cleanup, dispersion, or weathering processes which would determine the quality or quantity of oil that could eventually come in contact with sections of coastline or specific resources. Assuming the 5-percent probability that commercial amounts of oil/gas are discovered in the proposed sale area, and that production occurs, there is a 98-percent probability that at least four 1,000-barrel oilspills could occur during the estimated 26-year life of the field (USGS, 1980). Viewed in this respect, all blocks in the proposed sale area pose some degree of pollution risk to the environment. The potential effects of a large (1,000 bbl) oilspill are discussed below and in greater detail in section IV of this EIS. Chronic oilspills and spills smaller than 1,000 barrels would likely occur during the life of the project and could result in adverse effects on the environment and other resource uses. Onshore development would result in socioeconomic impacts which could have State, regional, and/or local implications.

The following discussion assumes that all laws, regulations, and orders, as well as the mitigating measure concerning protection of cultural resources (sec. II.B.2.b.) are part of the proposal. If the mitigating measures described in sections II.B.2.c. and d. were adopted, it is expected that some impacts described in this FEIS would be reduced.

Assuming the 5-percent probability that oil and gas are discovered in economically recoverable amounts and assuming that an oilspill occurs, the spill would have a 94-percent chance of reaching coastal habitats within 10 days after the spill. The probability of a spill reaching coastal habitats is high because the proposed sale area is relatively close to the shoreline. Although species would be variously affected, intertidal dwelling species, such as razor clams, could be destroyed outright or tainted for a period of up to 1 year.

Groundfish, halibut, and other populations of demersal fish species in the Shelikof Strait area may be reduced by the effects of oilspills by some unquantifiable amount during the life of the proposal. This is especially true of halibut, a species widely distributed within the strait and whose larvae are subject to pollution risk for 6 months of the year. Salmon generally are the most vulnerable of the commercial species to pollution events due to their dependence on inshore areas. Pink salmon populations are more susceptible to the effects of pollution than other salmon species. A pollution event could adversely affect, in unquantifiable terms, a year class or more of fry, as well as a year class or more of adults. Pink salmon populations that use the streams on the west side of Kodiak Island, particularly between Uganik Bay and Malina Bay, and those that spawn in Kamishak Bay, would be more adversely affected from an oilspill event than elsewhere in the area. Salmon using western Kodiak streams could lose an entire year class, an effect that could last for 5 years or more.

The Uganik Bay to Malina Bay area of Kodiak Island and other sections of the Shelikof Strait pose high risk from a pollution event to crab, shrimp, and other shellfish. Impacts to such species would likely be local, but could be of long duration. The egg and larval forms of crab species are most susceptible to the effects of pollution events, although the cumulative effects of increased oil and gas production and transportation could directly affect adult crab populations to an unknown extent through contamination or reduction of food sources. This could also be true of shrimp and other shellfish, especially in the Shelikof Strait area. Potential oilspills pose a high risk to shrimp populations on the west side of Kodiak Island and in the larval drift area off Kachemak Bay.

The proposed sale would have little or no affect on the Homer, Port Lions, Seldovia, and Kenai commercial fisheries as a whole. Fisheries impacts that may occur from chronic and catastrophic oilspill events are expected to be localized. Multiple-use conflicts between oil and gas activity and commercial fishing should be localized, of relatively short duration, and subject to remedial action. Impacts on the Kodiak-based fisheries would be localized, and could be of moderate intensity depending on the intensity of U.S. bottom-fishing in the Shelikof Strait area.

Marine and coastal birds and their habitats could be severely impacted by an oilspill event, especially in the Shelikof Strait area. Major impacts (25-75% mortality of a bird species population) from spill incidents could occur in locations such as the Barren Islands, Shelikof Strait, Kupreanof Strait, and Whale Passage. Some vulnerable bird species indicated in the impact discussion could take as long as 50 years to recover from a single 50 percent mortality event.

Among marine mammals, sea otter populations would likely sustain direct mortality as a result of oilspills, particularly the relatively dense populations of the northern Kodiak Archipelago. Harbor seals, particularly those of Kamishak Bay and the Shuyak-Afognak Islands, would likely be subjected to indirect effects through reduced habitat quality and/or food resources, but would be less likely than sea otters to sustain direct mortality. Major sea lion concentrations of the Barren Islands and Shelikof Strait would likely sustain indirect and, possibly, direct effects from oilspill incidents. Sea lions could lose from 1 to 2 years of productivity depending on the time of year a spill occurred. The siting of tanker facilities on eastern Kodiak Island would increase risk of adverse effects on marine mammals of the Marmot Bay area and to marine mammal habitats of Portlock Bank, a major feeding area for sea lions, fur seals, and cetaceans.

It is possible that gray, fin, humpback, and possibly sei whales, which frequent nearshore habitats of the northern Kodiak Archipelago and Shelikof Strait, would be affected directly or indirectly if an oilspill occurred in these areas. Construction of tanker facilities on eastern Kodiak Island may lead to localized disturbance of cetaceans, and, as a result of tanker traffic, could pose oilspill risks to important offshore feeding areas, such as Portlock Bank.

The impacts from oil and gas production and transfer activities on primary and secondary species (and associated habitat) harvested for subsistence purposes within village subsistence-use areas cannot be quantified at this time, but are assessed at a high probability of risk from oilspill incidents. The proposal would subject the subsistence of the Kodiak Island villages along Shelikof Strait to a higher potential risk from an oilspill than for those villages elsewhere in the lease sale area. But, the cumulative effects of the proposal in relation to other oil and gas activities in the vicinity places the subsistence for the villages of English Bay and Port Graham at a risk approximating those of Kodiak Island villages. Port Lions and Ouzinkie would be additionally subject to the effects, undeterminable at this time, of chronic discharges and tankering incidents resulting from the oil terminal facility at Talnik Point. The same may be true of Homer near the Anchor Point environs terminal facility. The direct and indirect consequences at the village level of a major oilspill incident damaging locally-used subsistence resources and/or habitats could include restricted local hunting or fishing, for a duration consistent with the damage incurred; social and cultural stress associated with the shortage of customary and traditional resources in the places they are usually found; increased cost in time and money to replace lost resources, assuming local transportation means were suitable for using an extended harvest range; and problems of food distribution and local storage should crisis-oriented replacement programs be initiated.

Sociocultural systems impacts could be expected in the communities of Kodiak, Port Lions, and Homer with differing effects. The potential for confrontation would exist in Kodiak basically between fisheries-oriented residents and activities and newer oil-related residents and activities. Conflict could be intensified by a significant oilspill incident. Impacts on sociocultural systems of Port Lions also could be significant, including the addition of a substantial new subpopulation to the town, temporary degradation of the town environment during construction activities, and temporary reduction in the quality of life associated with these changes. In Homer, the potential for major oil and gas onshore facilities nearby would likely increase debate over the direction of community growth and character and could result in controversy similar to that experienced earlier in Homer over lease sale CI.

Port Lions could anticipate major population, employment, and economic stimuli if an oil storage and tanker terminal facility were sited there. Being a small community with an expected slow (3%) annual rate of growth, the operations of an oil terminal facility and related functions could almost double the number of jobs available over the next two decades. Likewise, the Homer area would probably experience similar, though less extensive, effects if an oil terminal site were to be located in the vicinity of Anchor Point. Homer is expected to be impacted less from OCS activities than from other sources of economic stimulus, which are expected to produce an employment growth rate of 5.2 percent annually during the next decade. This rate of growth in employment would increase to 6.5 percent with the lease sale. Elsewhere, the lease sale would be expected to produce only marginal increments in employment growth in the Kenai, Kodiak, and Anchorage areas and little or no economic stimulus to the villages on the Kenai Peninsula or Kodiak Island.

Significant impacts could be expected to all modes of transportation serving Port Lions. A major expansion of the Port Lions airfield, possibly including extension of the runway into Kizhuyak Bay, would be required for the facility to function as a forward air support base to OCS operations in Shelikof Strait. Air traffic volume would increase dramatically, especially during the development phase, as would ground traffic in and around Port Lions. An additional 21 kilometers (15 mi) of roadway would be required to connect the airfield with the oil storage and marine tanker terminal near Talnik Point, as well as to service the onshore pipeline system. The operations near Talnik Point would produce the primary marine transportation impacts, in the short run, through summer barge traffic of rock and construction materials to the site. This would temporarily interfere with fishing in Kizhuyak Bay. The impact of tanker traffic (approximately 5 vessels per month) to and from an oil facility near Talnik Point could produce the long-term impact of reducing the availability of nearby fishing grounds over the life of the facility. The navigational uncertainties of Whale Passage suggest it would be unlikely that a marine service and supply base would be constructed at Port Lions. Thus, there would be no impact from this source. Transportation impacts from this proposed sale would likely be minor to insignificant in the Anchorage area and minor to moderate, especially with respect to ground transportation, on the transportation systems of the Kenai Peninsula.

The cumulative effects which could result from the proposed action and other major projects (sec. IV.A.1.h.) would be similar to, but more extensive than the impacts which have been previously described with the exception of transportation.

A major cumulative effect in marine traffic congestion could result if the need arises to simultaneously construct an oil facility at Talnik Point and the Port Lions small boat harbor. Increased marine traffic, approximately 30-40 percent of all tanker traffic generated in the next decade, would be the principal cumulative effect with regard to transportation within Cook Inlet.

2. Alternative II - No Sale

a. Description of the Alternative: This alternative is one which removes the entire proposed sale area from consideration for lease.

b. Summary of Probable Impacts: To eliminate the proposed sale may reduce future OCS oil and gas production, require escalated imports of oil and gas, and create the national need to develop alternative energy sources to reduce the impacts from the cancellation of the sale (table II.B.2.b.-1).

Recent surpluses of high sulpher, low gravity Alaskan crude oil in southern California are short-term until permanent transportation systems are in place to move the crude to inland markets or until the system adjusts fully to shipping the crude to the Gulf of Mexico coast. The oil and gas that could become available from the proposal over the next 25-year period could add to national domestic production. If this proposal is cancelled, an additive impact of greater oil and gas deficits resulting in increased imports can be expected (table II.B.2.b.-1). If sales such as this are cancelled, the energy actions or sources shown in the table might be used as substitutes. Based upon the range of undiscovered resources estimated by the USGS for the proposed sale area, table II.B.2.b.-1 presents the energy equivalents which would be required for other energy sources to substitute for this proposed action.

The Department of the Interior's FEIS for OCS lease sale 48 (sec. VIII.D.) and the FEIS for the proposed 5-year OCS oil and gas lease sale schedule (sec. I.B.7.). contain a discussion of trends in alternative energy sources.

The future U.S. energy source mix will depend on a multiplicity of factors, among them the identification of resources, research and development efforts, development of technology, rate of economic growth, the economic climate, changes in lifestyle and priorities, capital investment decisions, energy prices, world oil prices, environmental quality priorities, government policies, and availability of imports. Table II.B.2.b.-1 shows the amount of energy from other souces needed to replace anticipated mean level resources from proposed sale 60.

The acceptability of oil and gas imports as an alternative is diminished by:

> The security risks inherent in placing reliance for essential energy supplies on sources which have demonstrated themselves to be politically unstable and prone to use interruption of petroleum supplies as a way to exert economic and political pressure on their customers.

Table II.B.2.b.-1
Energy Needed from Other Sources to Replace Anticipated Oil and Gas Production from Proposed OCS Sale 60
(Mean Level of Resources if Resources are Found)

Total Crude Oil Production (bbls)	670×10^6
Total Natural Gas Production (cf)	1.173×10^{12}
Crude Oil BTU Equivalent @ 5.6×10^6 BTU/bbl (BTU)	3752×10^{12}
Natural Gas Equivalent @ 1021 BTU/cu.ft. (BTU)	1197.633×10^{12}
Total Oil and Gas Equivalent (BTU) (T O&G ÷ 5.6)	4949.633×10^{12}
Alternative Energy Sources	
Import Equivalents	
Oil Import Equivalents (bbls) 5.6×10^6	$.883863 \times 10^9$
Gas Import Equivalents (cu.ft.) Tot. O&G ÷ 1021	4.8478×10^{12}
Coal[a] Import Equivalents (tons) Tot. O&G ÷ 24×10^6	206.2347×10^6
Coal for Gasification (tons)	2.0618×10^8
Coal Gasification [b], Low BTU Number of Plants	1.22
Oil Shale [c] (tons)	1.262×10^9
Nuclear Capacity [d] Number of Light H_2O Reactors with 1000 MW(e) capacity	3.764
First Core Fuel U_3O_8 [e] (tons)	112.933
Annual Reload	37.64

---

[a] 1 Ton = 24×10^6 BTU hence $4949.633 \times 10^{12} \div 24 \times 10^6 = 206.2347 \times 10^6$

[b] Assuming Koppers-Totzek processing requiring 10,570 tons/day of coal for an output of 250×10^9 BTU's/day. Also assumes coal of 8,780 BTU's per pound.

Note: The above, and following conversion ratios were developed from sale BF December 1979, for this application:

e.g. Where $\frac{1.56}{5.86 \times 10^{15}}$ is to $\frac{Z}{4.949 \times 10^{15}}$ $Z = 1.21748$. Rounded to 1.32

[c] Assuming high grade shale recovery of 0.7 barrels per ton of oil shale.

[d] One kilowatt-hour equals 3,421 BTU at a theoretical conversion rate of other energy forms to electricity at 100 percent efficiency. Capacity is calculated assuming an 80 percent plant factor and 33 percent efficiency of fossil fuel electricity generation.

[e] Assuming 30 metric tons enriched U_3O_8 first core fuels, and 10 metric tons enriched U_3O_8 annual reloads with plutonium recycle for each normalized 1,000 MW(e) light water reactor.

The aggravation of unfavorable international trade and payments balances which would accompany substantial increases in oil and gas imports.

Apparent high costs of liquefying and transporting natural gas other than overland by pipeline.

Impacts could occur as a result of development of alternative energy sources. Refer to the FEIS for the proposed 5-year oil and gas lease sale schedule and the FEIS for OCS sale 55 (DOI, 1980) for general discussions of potential impacts associated with the development of alternative energy sources.

This alternative would retain the proposed sale area in its present form for consideration as a marine sanctuary (see sec. IV.A.4.q.).

3. Alternative III - Delay the Sale:

a. Description of the Alternative: This alternative would delay the implementation of the proposal as previously described in section II.B.1.a. for a 2-year period. The impacts associated with this alternative are not necessarily avoided, but are delayed and may be reduced to some extent by future changes that might occur to improve the environmental controls applied to this action. The nature and extent of such controls are unknown.

b. Summary of Probable Impacts: The impacts of the delay of sale alternative are similar to those for the proposal, delayed but not avoided. For a few impacts, however, the delay could make a difference in degree of severity. Potential impacts on Port Lions could be reduced if the city used the time to study and prepare strategies/plans in the context of existing community facilities, services, expectations, and limitations to accommodate major population and oil facility impacts. Additional time would also provide the opportunity to fill biological data gaps, existing especially in the Shelikof Strait area, for finfish and shellfish populations, marine mammals and cetaceans, marine and coastal birds, and vulnerable coastal habitats. Such data has biological as well as social significance to the renewable resource sector of Kodiak Island's economy and to localized, subsistence-oriented village economies. Especially for the Shelikof Strait subsistence-use villages, delaying the sale would allow time for localized biological studies to be carried out on primary and alternate (secondary) subsistence species used by village residents. Such studies would be useful for better assessing the biological impact of oilspill incidents on discrete ecosystems and for pollution contingency planning to lower the risk to village subsistence resources.

The cumulative effects which could result from the proposed action and other major projects (sec. IV.A.1.h.) would be similar to, but more extensive than the impacts which have been described for the proposal (secs. II.B.1.f. and IV.A.2.).

4. Alternative IV: Modification of the proposed sale area by deletion of 19 blocks within Cook Inlet and 66 blocks within Shelikof Strait (total deletion of 85 blocks).

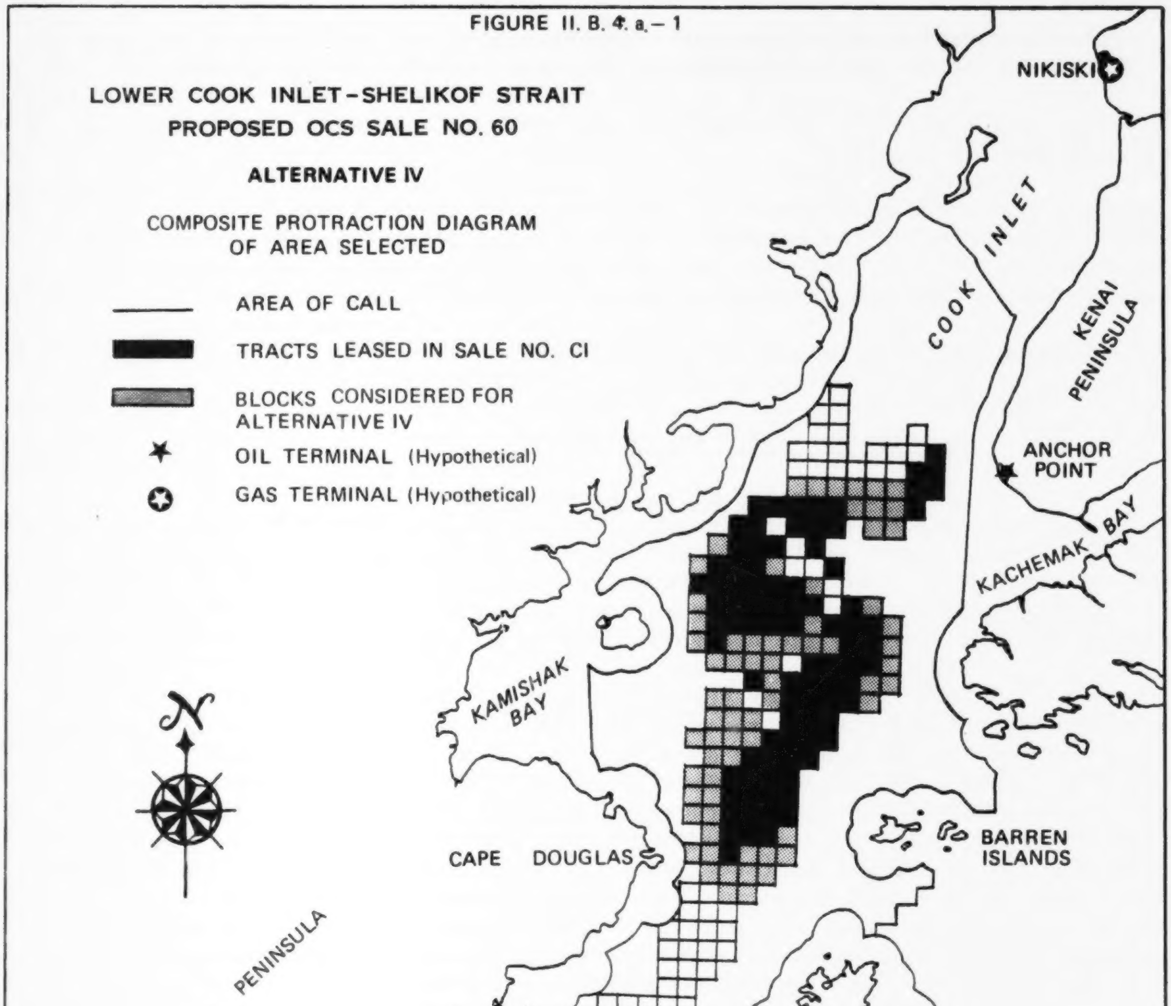
a. Description of the Alternative: This alternative involves the leasing of 68 blocks within lower Cook Inlet and the northern portion of the Shelikof Strait (fig. II.B.4.a.-1). The blocks proposed for leasing under

FIGURE II. B. 4. a.– 1

LOWER COOK INLET–SHELIKOF STRAIT PROPOSED OCS SALE NO. 60

ALTERNATIVE IV

COMPOSITE PROTRACTION DIAGRAM OF AREA SELECTED


AREA OF CALL
TRACTS LEASED IN SALE NO. CI
BLOCKS CONSIDERED FOR ALTERNATIVE IV
OIL TERMINAL (Hypothetical)
GAS TERMINAL (Hypothetical)
N
NIKISKI
COOK INLET
KENAI PENINSULA
ANCHOR POINT
KACHEMAK BAY
KAMISHAK BAY
BARREN ISLANDS
CAPE DOUGLAS
ALASKA PENINSULA
AFOGNAK ISLAND
TALNIK POINT
GULF OF ALASKA
SHELIKOF STRAIT
CHINIAK BAY
KODIAK ISLAND
CAPE CHINIAK
CAPE IKOLIK

Source: Alaska Outer Continental Shelf Office 1980

this alternative comprise an area of about 154484 hectares (381,443 acres). The blocks are located approximately 11 to 37 kilometers (7 to 23 mi) offshore in water depths of 35 to 187 meters (115 to 613 ft). See appendix J for block size, distance from shore, and water depth.

According to known geophysical data, the Geological Survey, based on unrisked statistical estimates, projects the 68 blocks offered in this alternative have a 5 percent chance of containing commercial resources amounting to 260 MMbbls of oil and 456 Bcf of natural gas. The deletion of the blocks required by this alternative would result in reducing the estimated recoverable resources by some 410 MMbbls of oil and 717 Bcf of gas below those of the proposal.

Exploration is hypothesized to begin in 1982 and continue through 1985 with a total of 10 exploration and delineation wells drilled. No more than two rigs will be assumed to be in operation during any year of the exploratory period. Jack-up rigs could be used in areas where water depths are less than 61 meters (200 ft). Semisubmersibles could be used in areas of deeper water.

Primary maritime support and supply activities would occur from existing industry facilities at Kenai. Aircraft support would be conducted from airfield(s) on the Kenai Peninsula.

Pipeline construction would begin in 1984 and continue through 1986. There would be two pipeline systems totaling about 402 kilometers (250 mi). Of that length, 290 kilometers (180 mi) would be offshore pipeline, split evenly between an oil and a gas pipeline system. Both pipelines would landfall at a site located between Anchor Point and Stariski Creek on the Kenai Peninsula.

The oil would be processed at a terminal at this site; the gas would continue 113 kilometers (70 mi) by overland pipeline to Nikiski. There the gas would be liquefied at an existing LNG facility and transported to market.

Pipeline diameters assumed for this alternative are 18 inches for oil and 10 inches for gas. All offshore pipe would be emplaced by either a lay or reel barge. Standard pipe lay barges can operate in wave heights up to 1.5 meters (5 ft). As the weather throughout the proposed sale area is generally inclement, it is probable that larger lay barges, such as the "Viking Piper," would be used in order to minimize downtime.

Oil and gas production would begin in 1987. By that year, two pile-supported steel tower production platforms would be installed. By 1989, some 76 production and service wells would be drilled. Both oil and gas production would cease in 2009. The estimated life of this field is 22 years.

A summary of activities required to develop the estimated resources of this alternative is on table II.B.4.a.-1. Note the frame of reference as described in section II.A. ('Resource Estimates and Production Assumptions').

b. Summary of Probable Impacts: The deletion of blocks in Shelikof Strait and the elimination of offshore air support and oil terminal facilities from the Kodiak Archipelago, would significantly reduce potential impacts on these areas as compared to the proposal. Potential impacts from oilspills on marine mammals, birds, and coastal habitats would be reduced substantially in the Shelikof Strait. Risk to marine mammals and marine

Table II.B.4.a.-1
Summary of Activities Required to Develop the Estimated Resources Within Alternative IV

---

1. Estimated acreage, construction activity, and resources:
    - a. Sale Acreage Offering: 154484 hectares (381,443 acres)
    - b. Exploration and Delineation Wells: 10
    - c. Production Platforms: 2
    - d. Production and Service Wells: 76
    - e. Workover Wells: 244
    - f. Pipelines:

	Oil (18" diameter)	Gas (10" diameter)
Offshore length:	145-153 km (90-95 mi to Anchor Point)	145-153 km (90-95 mi to Anchor Point)
Onshore length:	0	113 km (70 mi to Nikiski)

g. Terminal(s):

Oil: 1 (Anchor Point)
Gas: Use existing terminal at Nikiski.

h. Recoverable Hydrocarbons:

	Oil	Gas
Total Production:	260.0 MMbbls	456.0 Bcf
Peak Production:	119.7 Mbbls/D	209.0 MMcf/D
Average Annual Production:	11.3 MMbbls	19.8 Bcf

2. Estimated peak annual transportation by tanker:
   Oil: 43.7 MMbbls
   LNG: 23 MMbbls

3. Estimated tonnage (2,000lbs/ton) of commercial muds and volume of drill cuttings (assuming 10 exploration wells at 4864 meters (16,000 ft) and 76 production wells at 3040 meters (10,000 ft):

Exploration/Production

	Exploratory Period		Production Period	
	Per Well	Total Field	Per Well	Total Field
Muds:	947 metric tons (1,044 tons)	9,470 metric tons (10,440 tons)	680 metric tons (750 tons)	6,392 metric ton (7,031 tons)
Cuttings:	$539m^3$ ($704\ yd^3$)	$5390m^3$ ($7,040\ yd^3$)	$206m^3$ ($269\ yd^3$)	$15,656m^3$ ($20,444\ yd^3$)

* Please note that during the production and development period drill mud is reused. Approximately 10 percent of the total drill mud used is lost downhole.

4. Estimated volume of formation water produced:
A prediction cannot be made at this time due to incomplete knowledge of the subsurface geology of the Shelikof Strait. However, based upon the behavior of the upper Cook Inlet field we may hypothesize that at midlife the sale 60 field will be producing one barrel of formation water for every two barrels of oil or approximately 5 MMbbls per year.

5. Estimated land use requirements for onshore facilities:

Support/Supply: Existing facilities will suffice.

	Oil	Gas
Terminal(s) and related facilities:	1 terminal (31 hectares/76 acres)	0

6. Estimate burial disturbance of offshore pipeline (assuming 2377 m^3/km (5,000 yd^3/mi) for oil pipeline and 1902 m^3/km (4,000 yd^3/mi) for gas pipeline):

Oil: 344665-363681 m^3 (450,000-475,000 yd^3)

Gas: 275790-291006 m^3 (360,000-380,000 yd^3)

mammal habitats from direct and indirect effects of pollution would remain high in the northern Kodiak Archipelago area, but would be much less than that of the proposal, particularly since no tanker facility would be located on eastern Kodiak Island, and less tanker traffic would occur in the vicinity of eastern Kodiak Island and over Portlock Bank. Risk to areas of high subsistence use and dependence along the strait would be significantly reduced.

Impacts on the human and biological environments of the Kenai Peninsula/Cook Inlet area would similar to those described for the proposal. Marine mammals, cetaceans, and bird populations that use the Barren Islands area would be subject to essentially the same impacts, principally from potential oilspill incidents, as described for the proposal. Risk to the subsistence use areas of the villages of English Bay and Port Graham from potential oilspills would be the same as the proposal for both the alternative alone and for the cumulative case.

The cumulative effects which could result from this alternative and other major projects (sec. IV.A.1.h.) would be similar to, but more extensive than the impacts which have been described above, but would be less than the proposal because of the deletion of blocks in Shelikof Strait.

5. Alternative V: Modification of the proposed sale area by the deletion of 19 blocks in Cook Inlet and 81 blocks in Shelikof Strait (total deletion of 100 blocks).

a. Description of the Alternative: This alternative involves the leasing of 53 blocks located entirely within the lower Cook Inlet (fig. II.B.5.a.-1). The blocks proposed for leasing under this alternative comprise an area of about 126816 hectares (313,125 acres). The blocks are located approximately 11 to 37 kilometers (7 to 23 mi) offshore in water depths of 35 to 150 meters (115 to 492 ft). See appendix J for block size, distance from shore, and water depth.

According to known geophysical data based on unrisked statistical estimates (USGS, 1980), the 53 blocks offered in this alternative have a 5 percent chance of containing commercial resources amounting to 180 MMbbls of oil and 316 Bcf of natural gas. The deletion of the blocks required by this alternative results in a reduction of the estimated recoverable resources by some 490 MMbbls of oil and 857 Bcf of gas below those of the proposal.

Exploration is hypothesized to begin in 1982 and continue through 1985 with a total of six exploration and delineation wells drilled. No more than two drilling rigs would be assumed to be working during any year of the exploratory period. Jack-up rigs could be used in areas where water depths are less than 61 meters (200 ft). Semisubmersibles would be used in areas of deeper water.

Primary maritime support and supply activities would occur from existing industry facilities at Kenai. Aircraft support would be conducted from airfield(s) located on the Kenai Peninsula.

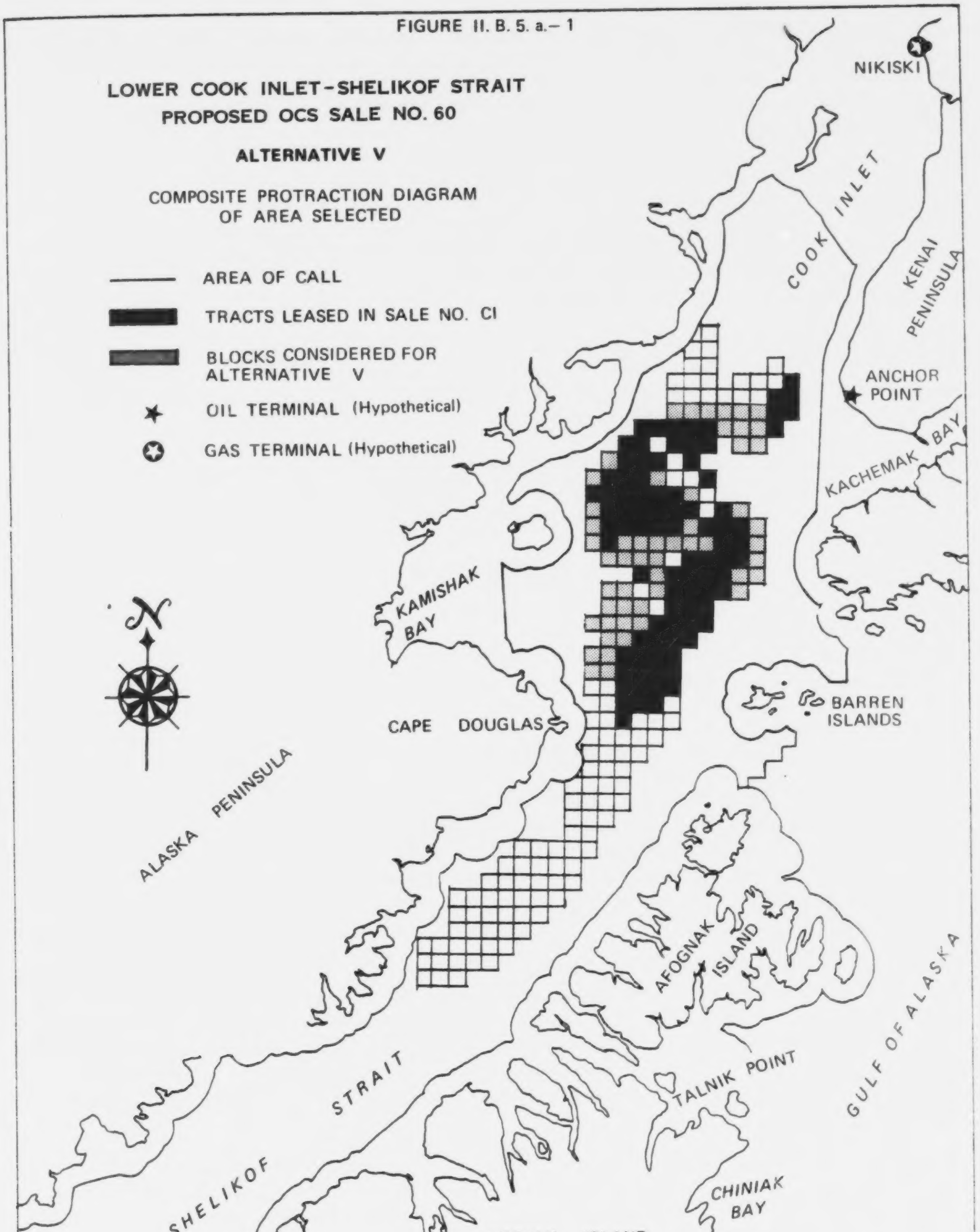
Pipeline construction would begin in 1985 and continue through 1986. There would be two pipeline systems totaling about 369 kilometers (230 mi). Of that length, 257 kilometers (160 mi) would be emplaced under water. The mileage

FIGURE II. B. 5. a.– 1

LOWER COOK INLET-SHELIKOF STRAIT
PROPOSED OCS SALE NO. 60

ALTERNATIVE V

COMPOSITE PROTRACTION DIAGRAM
OF AREA SELECTED


AREA OF CALL
TRACTS LEASED IN SALE NO. CI
BLOCKS CONSIDERED FOR ALTERNATIVE V
OIL TERMINAL (Hypothetical)
GAS TERMINAL (Hypothetical)
N
NIKISKI
COOK INLET
KENAI PENINSULA
ANCHOR POINT
KACHEMAK BAY
KAMISHAK BAY
CAPE DOUGLAS
BARREN ISLANDS
ALASKA PENINSULA
AFOGNAK ISLAND
GULF OF ALASKA
TALNIK POINT
SHELIKOF STRAIT
CHINIAK BAY
KODIAK ISLAND
CAPE CHINIAK
CAPE IKOLIK

Source: Alaska Outer Continental Shelf Office 1980

would be split evenly between an oil and gas pipeline system. Both of these routes would terminate at an oil terminal located between Anchor Point and Stariski Creek. The gas pipeline would continue overland 113 kilometers (70 mi) to Nikiski. There, the gas would be liquefied at a then-existing LNG facility and transported to market.

Pipeline diameters assumed for this alternative are 18 inches for oil and 10 inches for gas. All offshore pipe would be emplaced by either a lay or reel barge. Standard pipe lay barges can operate in wave heights up to 1.5 meters (5 ft). As the weather throughout the proposed sale area is generally inclement, it is probable that larger lay barges, such as the "Viking Piper," could be used in order to minimize downtime.

Oil and gas production would begin in 1987. By that year, two pile-supported steel tower production platforms would be installed. By 1988, some 53 production and service wells would be drilled. Both oil and gas production would cease in 2008. The estimated life of this field is 22 years.

A summary of activities required to develop the estimated mean resources of this alternative is on table II.B.5.a.-1. Note the frame of reference as described in section II.A. ('Resource Estimates and Production Assumptions').

b. Summary of Probable Impacts: The deletion of blocks in Shelikof Strait and the elimination of offshore oil/gas support and oil terminal facilities from the Kodiak Archipelago, would significantly reduce potential impacts on these areas as compared to the proposal. Potential impacts from oilspills on marine mammals, birds, and coastal habitats would be reduced substantially in Shelikof Strait. Risk to marine mammals and marine mammal habitats from direct and indirect effects of pollution would remain high in the northern Kodiak Archipelago area, but would be much less than that of the proposal, particularly since no tanker facility would be located on eastern Kodiak Island, and less tanker traffic would occur in the vicinity of eastern Kodiak Island and over Portlock Bank. Risk to areas of high subsistence use and dependence along the strait would be significantly reduced. Alternative V provides an increased, but unquantifiable, level of protection from potential oilspills to the east side of Afognak Island (commercial fishing) and other areas of the northern Kodiak Archipelago compared to the proposal and alternative IV.

Impacts on the human and biological environments of the Kenai Peninsula/Cook Inlet area would be similar to those described for the proposal and for alternative IV. Marine mammals, cetaceans, and bird populations that use the Barren Islands area would be subject to fewer impacts from potential oilspill incidents compared to the proposal. Risk from potential oilspills to the subsistence use areas of the villages of English Bay and Port Graham would be the same as the proposal.

The cumulative effects which could result from this alternative and other major projects (sec. IV.A.1.h.) would be similar to, but more extensive than the impacts which have been described above but would be less than the proposal because of the deletion of blocks in Shelikof Strait.

6. Alternative VI: Modification of the proposed sale area by the deletion of all blocks within lower Cook Inlet (total deletion of 86 blocks).

Table II.B.5.a.-1
Summary of Activities Required to Develop the Estimated Resources Within Alternative V

---

1. Estimated acreage, construction activity, and resources:

a.	Sale Acreage Offering:	126815 hectares (313,125 acres)
b.	Exploration and Delineation Wells:	6
c.	Production Platforms:	2
d.	Production and Service Wells:	53
e.	Workover Wells:	168

f. Pipelines:

	Oil (18" diameter)	Gas (10" diameter)
Offshore length:	129 km (80 mi to Anchor Point)	129 km (80 mi to Anchor Point)
Onshore length:	0	113 km (70 mi to Nikiski)

g. Terminal(s):

Oil: 1 (Anchor Point)
Gas: Use existing terminal at Nikiski.

h. Recoverable Hydrocarbons:

	Oil	Gas
Total Production:	180.0 MMbbls	316.0 Bcf
Peak Production:	89.9 Mbbls/D	157.5 MMcf/D
Average Annual Production:	8.2 MMbbls	14.4 Bcf

2. Estimated peak annual transportation by tanker:

Oil: 32.8 MMbbls
LNG: 17 MMbbls

3. Estimated tonnage (2,000 lbs/ton) of commercial muds and volume of drill cuttings (assuming 6 exploration wells at 4864 meters (16,000 ft) and 53 production wells at 3040 meters (10,000 ft):

Exploration/Production

	Exploratory Period		Production Period	
	Per Well	Total Field	Per Well	Total Field
Muds:	947 metric tons (1,044 tons)	5682 metric tons (6,624 tons)	680 metric tons (750 tons)	4828 metric tons (5,311 tons)
Cuttings:	$539 m^3$ ($704 yd^3$)	$3234 m^3$ ($4,224 yd^3$)	$206 m^3$ ($269 yd^3$)	$10918 m^3$ ($14,257 yd^3$)

* Please note that during the production and development period drill mud is reused. Approximately 10 percent of the total drill mud used is lost downhole.

4. Estimated volume of formation water produced:
A prediction cannot be made at this time due to incomplete knowledge of the subsurface geology of the Shelikof Strait. However, based upon the behavior of the upper Cook Inlet field we may hypothesize that at midlife the sale 60 will be producing o barrel of formation water for every two barrels of oil, or approximately 4 MMbbls p year.

5. Estimated land use requirements for onshore facilities:

Support/Supply: Existing facilities will suffice.

	Oil	Gas
Terminal(s) and related facilities:	1 terminal (23 hectares/59 acres)	0

6. Estimated burial disturbance of offshore pipeline (assuming 2377 m^3/km (5,000 yd^3/m for oil pipeline and 1902 m^3/km (4,000 yd^3/mi) for gas pipeline):

Oil: 306633 m^3 (400,000 yd^3)

Gas: 245358 m^3 (320,000 yd^3)

a. Description of the Alternative: This alternative involves the leasing of 67 blocks located entirely within Shelikof Strait (fig. II.B.6.a.-1). The blocks proposed for leasing under this alternative comprise an area of about 154080 hectares (380,630 acres). The blocks are located approximately 10 to 27 kilometers (6 to 16 mi) offshore in water depths of 119 to 219 meters (390 to 718 ft). See appendix J for block size, distance from shore, and water depth.

According to known geophysical data, the U.S. Geological Survey projects that the 67 blocks offered in this alternative have an estimated 5 percent chance of containing commercial resources amounting to 335 MMbbls of oil, or one-half of the amount stated for the proposed action. All gas produced in this alternative would probably not be viewed as being economically recoverable and would be assumed to be reinjected into the formation.

Exploration is hypothesized to begin in 1982 and continue through 1986 with a total of 11 exploration and delineation wells drilled. No more than two rigs would be assumed to be in operation during any year of the exploratory period.

Jack-up rigs could be used in areas where water depths are less than 61 meters (200 ft). Semisubmersibles could be used in areas of deeper water.

Primary maritime support and supply activities would occur from existing industry facilities at Kenai. Aircraft support would be conducted from airfield(s) at Port Lions and possibly at Cape Chiniak.

Pipeline construction would begin in 1985 and continue through 1986. A single 144 kilometers (90 mi) oil pipeline system would be constructed. Of the total pipeline length, some 128 kilometers (80 mi) would be constructed offshore with the final 16 kilometers (10 mi) emplaced on land.

Oil pipeline diameter assumed for this alternative would be 18 inches. The oil pipeline would service the entire Shelikof Strait. It would be constructed through Kupreanof Strait to Chernof Point, and then overland to a tanker loading terminal constructed near Talnik Point. A facility near Talnik Point would be exposed to northern weather and would require a protective breakwater. Oil tankers enroute to a facility near Talnik Point would arrive from the Gulf of Alaska via Marmot Bay.

Standard pipe lay barges can operate in wave heights up to 1.5 meters (5 ft). As the weather throughout the proposed sale area is generally inclement, it is probable that larger lay barges, such as the "Viking Piper," would be used in order to minimize downtime.

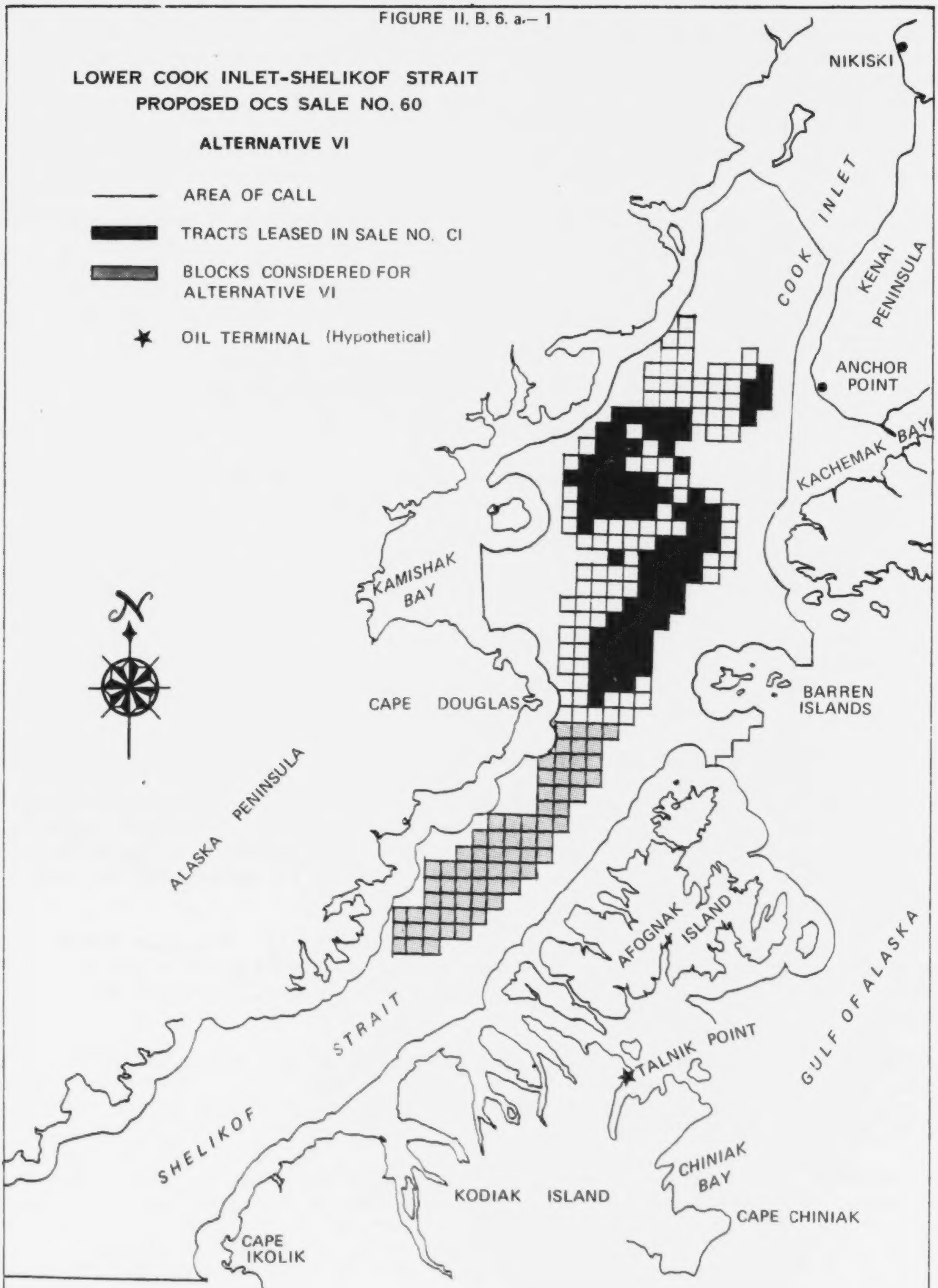
Oil production could begin in 1987. By that year, two pile-supported steel tower production platforms could be installed. By 1989 some 96 production and service wells may be drilled. By 2009 oil production could cease. The estimated life of this field is 23 years.

Alternative VI is the result of input which was received late in the scoping process. As a result, the scenario associated with this alternative did not receive the same level of detailed statistical analysis as was afforded alternatives I, IV, and V. However, the activities required to develop the resources of this alternative are very similar to that which is portrayed for

FIGURE II. B. 6. a.– 1

LOWER COOK INLET-SHELIKOF STRAIT
PROPOSED OCS SALE NO. 60

ALTERNATIVE VI


AREA OF CALL
TRACTS LEASED IN SALE NO. CI
BLOCKS CONSIDERED FOR ALTERNATIVE VI
OIL TERMINAL (Hypothetical)
N
NIKISKI
COOK INLET
KENAI PENINSULA
ANCHOR POINT
KACHEMAK BAY
KAMISHAK BAY
CAPE DOUGLAS
BARREN ISLANDS
ALASKA PENINSULA
AFOGNAK ISLAND
GULF OF ALASKA
TALNIK POINT
SHELIKOF STRAIT
CHINIAK BAY
KODIAK ISLAND
CAPE CHINIAK
CAPE IKOLIK

Source: Alaska Outer Continental Shelf Office 1980

the minimum case of the proposed action with the exception that gas is assumed to be reinjected. Refer to the appropriate minimum case tables in appendices A and B.

b. Summary of Probable Impacts: The deletion of tracts in lower Cook Inlet by alternative VI and the centering of onshore oil facilities on Kodiak Island would result in impacts on the human and biological resources of the Kodiak Archipelago and the Shelikof Strait area similar to those described for the proposal, with some exceptions. The location of onshore facilities on Kodiak Island could increase the impact from oilspill events to vulnerable coastal habitats in Marmot Bay if the hydrocarbon find in Shelikof Strait were such to warrant placing the entire offshore support operation there. Potentially reduced, but unquantifiable impacts on the subsistence resource-use areas of Larsen Bay, Ouzinkie, and Port Lions could be expected, although the impacts to renewable resources used in Marmot Bay may be similar to those described for the proposal. Fishermen who use the area from Uganik Bay to Malina Bay would have the same potential of being adversely impacted from an oilspill event as in the proposal. Risk from oilspills would be reduced somewhat over the proposal to the marine mammal and bird habitats of the northern Kodiak Archipelago and Shelikof Strait. The impact on sea lions, fur seals, and cetaceans that use Portlock Bank and nearshore marine habitats east of Kodiak Island could be as high as under the proposal from the cumulative effects of tankering out of Talnik Point.

The impacts on the biological and human environments of the lower Cook Inlet area would be substantially reduced compared to the proposal. Especially notable would be the reduction in impacts on marine mammal and bird habitats in the Anchor Point area and in Kamishak Bay.

The cumulative effects which could result from this alternative and other major projects (sec. IV.A.1.h.) would be similar to those described for the proposal in the Shelikof Strait and Kodiak and Afognak Island areas. There would be a slight reduction in cumulative effects on resources of the Cook Inlet area compared to the proposal because no blocks would be offered for lease in the inlet. However, because of existing and assumed oil and gas activities in lower Cook Inlet (sale CI and tankering through the inlet), risk to biological and human resources from potential oilspills would still be high.

C. Comparative Analysis of Impacts and Alternatives

This discussion deals with the most significant differences and similarities among impacts and alternatives in comparison with the proposed action, alternative I. Refer to page 21 for a summary of impacts that could result from the proposed action.

Alterative II could pose potentially adverse impacts on the national economy by causing increased dependence on imported oil and gas. Impacts could occur as a result of development of alternative energy sources. Refer to the FEIS for the proposed 5-year oil and gas lease sale schedule and the FEIS for OCS sale 55 (DOI, 1980) for a general discussion of potential impacts that could result from various alternative energy sources.

Alternative III (delay the sale) would delay potential impacts of the proposal, but would not avoid them. A reduction in biological and social impacts by some unquantifiable degree could be achieved if the delay were used to strategically plan for community impacts on Port Lions and to fill biological data gaps, especially with regard to birds and marine mammals. These studies could help to better understand potential impacts on the biological resources of Shelikof Strait and could provide more information so that potential impacts could be more effectively mitigated.

Alternative IV could significantly reduce major potential impacts on the human and biological resources of Kodiak Island and Shelikof Strait through significant block deletion within Shelikof Strait. Because no oil/gas activities would occur in Shelikof Strait, and onshore facilities would not be located at Talnik Point, the probability of an oilspill or chronic pollution occurring and contacting biological resources in the Kodiak Island area and Shelikof Strait would be lower than for the proposal. As a result, potentially adverse impacts associated with oil pollution would be significantly reduced with this alternative, particularly for marine mammals (especially sea otters), coastal birds, and nearshore fish that inhabit the northern portion of Shelikof Strait, Kupreanof Strait, and Marmot Bay. Potentially adverse effects of petroleum activity-related noise and disturbance on marine mammals (sea lions, harbor seals, and whales) and coastal birds would be eliminated in Shelikof Strait and the Kodiak Island area. Effects on the economies and sociocultural systems of Kodiak Island communities would be significantly reduced (eliminated) with this alternative compared to the proposal.

Since no petroleum-related activity would occur in Shelikof Strait, competition for ocean space between the oil industry (platforms, dock space, supply and support vessels) and the commercial fishing industry would not occur.

Likewise, loss of commercial fishing gear due to petroleum-related activity would not occur in the Shelikof Strait and Kodiak Island areas.

Potential impacts on the human and biological environments of the Barren Islands and lower Cook Inlet are expected to be the same as those described for the proposed action.

Alternative V would delete the entire Shelikof Strait area from leasing and follow the same developmental scenario as alternative IV. Major potential impacts on Kodiak Island and the Shelikof Strait may be significantly reduced compared to the proposal and would be about the same as those described for alternative IV. Potential impacts from oilspills to biological resources of the Barren Islands and Afognak Island would likely be reduced compared to the proposal, and would be reduced slightly compared to alternative IV. Major potential impacts on the human and biological environments of lower Cook Inlet and the Kenai Peninsula are expected to be similar to those described for the proposed action and alternative IV. Of all the alternatives, alternatives IV and V provide the greatest reduction of risk of potential impacts on biological resources.

Alternative VI would delete from leasing all blocks located in lower Cook Inlet. Thus, potential impacts on the biological and human environments of Cook Inlet and the Kenai Peninsula would likely be eliminated. Although this alternative would pose no risk to the biological and human resources of lower

Cook Inlet, risk to these resources from potential oilspills would still be high (though not as high as for the proposal or alternatives IV or V) because of existing and assumed oil and gas activities in the inlet (sale CI and tankering through the inlet). Potential impacts on the human and biological environments of Kodiak and Afognak Islands and Shelikof Strait would be essentially the same as those described for the proposal.

D. Analysis of Other Block Deletion Alternatives

Block deletions were recommended by eight agencies, organizations, and individuals as a result of the DEIS review and public hearing process. The description and environmental impacts of these recommendations can be found in section IV.B.

III. DESCRIPTION OF THE AFFECTED ENVIRONMENT

A. Physical Characteristics

1. Geology: This discussion summarizes a portion of the description of the affected environment contained on the back of graphics 1 through 4. Visual information is presented on graphic 1 and in appendix M of this FEIS.

The more significant potential physical constraints that could affect OCS activities in lower Cook Inlet and Shelikof Strait are potential hazards associated with earthquakes and seismic activity, tsunamis, and potential hazards associated with volcanism, especially Augustine Volcano.

The Cook Inlet/Shelikof Strait region is susceptible to earthquakes of magnitude 6.0 to 8.8 on the Richter scale. The recurrence of such great earthquakes as the 1964 Alaska earthquake in Prince William Sound is estimated to range from a minimum of 33 years to a maximum of 800 years. Damage to man-made facilities can be caused by ground shaking, ground failure, fault displacement, surface warping, seismic seawaves (tsunamis), and consolidation of soils.

The narrow elongated geometry of Cook Inlet reduces the chance that a tsunami generated outside the inlet would propagate significant destructive energy into it. However, local or subregional tsunamis generated within lower Cook Inlet or Shelikof Strait could significantly damage facilities located close to shore.

The occurrence of volcanism along the Aleutian Arc is the result of plate convergence between the North American and Pacific plates. Nineteen volcanoes form the eastern Aleutian Arc from the upper Alaska Peninsula to Cook Inlet. Eight of these have erupted during this century. The 1912 eruption of Mt. Katmai adjacent to the Shelikof Strait area was one of the world's largest eruptions. Augustine Volcano has erupted in recent years in lower Cook Inlet.

Various potential hazards of an eruption of Mt. Augustine include glowing avalanches (pyroclastic flows), mud flows, floods, minor lava flows, bomb and ash falls, noxious fumes, poisonous gases, acid rainfall, and local tsunamis. Most of these potential volcanic hazards, with the exception of ash falls, acid rain, and local tsunamis, would be confined to Augustine Island itself, but could extend a limited distance offshore.

Recently, the U.S. Geological Survey published a series of six maps and cross sections depicting the environmental geology of the Shelikof Strait region (Department of the Interior, U.S. Geological Survey, Open File Reports Nos. 80-2031 through 80-2036, 1980). These maps show the distribution of faults, potential unstable bottom sediments, potential gas-charged sediments, bathymetry, and the geologic features of Shelikof Strait. In addition, a recently published report by M. Hampton and A. Bouma (1979) on various environmental geology aspects of Cook Inlet and the Kodiak Shelf serves to augment descriptive material included on graphic 1.

2. Meteorological Conditions and Oceanography: This discussion summarizes a portion of the description of the affected environment contained on the back of graphics 1 through 4. Visual information is shown on graphic 2.

a. Meteorological Conditions: Meteorological conditions in lower Cook Inlet and Shelikof Strait are strongly influenced by the presence of mountains. Lower Cook Inlet is a transition zone between continental and marine meteorological conditions; whereas Shelikof Strait and the Alaska Peninsula are characteristic of Pacific maritime climatological conditions. The variability in temperature, average annual precipitation, and annual maximum sustained winds for selected return periods between the two oceanographic regions can be found in the tables on the back of graphics 1 through 4. In addition, a discussion is also given on temperature, precipitation, skycover, winds, and storms.

b. Physical Oceanography:

Circulation: The circulation of seawater throughout the proposed lease sale area can vary considerably on a seasonal and daily basis. A generalized circulation pattern from a variety of study efforts in Cook Inlet and Shelikof Strait was presented in graphic 2. The general circulation pattern for the area is influenced by waters from the Gulf of Alaska and fresh water input from the Copper River and from rivers of the Kenai Peninsula. These waters enter Kennedy and Stevenson Entrances where some of it moves northward and mixes with a strong surface outflow from upper Cook Inlet.

Short term fluctuation from a few days to a week occurs throughout the area and is generally more pronounced in areas of weaker current systems such as occur in parts of lower Cook Inlet. For a graphic example of the type of variation in surface transport that can occur spatially and seasonally in lower Cook Inlet refer to figures IV.A.1.d.2 through 6.

Some recent satellite infrared photographs have shown that during October and November there can be as much as a threefold increase in the amount of water entering lower Cook Inlet and Shelikof Strait. The general circulation pattern of this study area is not significantly changed from this input but does create more eddies and wave length flow. There may be as much as a threefold increase in the rates of the flow for some parts of Shelikof Strait during this 2-month period (Hufford, personal communications).

Tides: The main driving force for surface circulation is the tides. Typical ranges between successive high and low waters are from 3.7 to 5.5 meters (12 to 18 ft) with wider ranges in the upper reaches of the inlet. Tidal currents of 2 to 3 knots have been measured at Kennedy Entrance, 4 to 5 knots at Cape Douglas, and up to 8 knots at the Forelands.

Energy from the tides is dissipated largely by bottom friction. Submarine television observations have revealed extensive sand transport moving at 10 to 14 centimeters per second near the bottom. Bottom currents causing this sand transport may be as great as 50 centimeter per second in the lower Cook Inlet region (Bouma, 1978).

Noise: The background noises from biotic sources is addressed in sections IV.A.2.d. and e.

Surface Trajectories: Several drift bottle studies were discussed in section III.A.2.b. of the DEIS. These studies provide some indication of the trajectory of a surface pollutant but no indication of the actual rate of movement. The results of more extensive modelling techniques of surface flow are presented in section IV.A.1.d. of this FEIS.

The discussion of vulnerable habitats with respect to surface trajectories is given in section IV.A.1.e.

c. Chemical Oceanography:

Salinity: On graphic 2, the salinity ranges are units part per thousand (0/00).

Heavy Metals: Suspended particulates were collected from the same two transects shown in figure III.A.2.b.-1 on the back of graphics 1 through 4. Suspended particulates are significantly higher (2-3 orders of magnitude) in heavy metal content than was found in the filtered water samples. The bioavailability of heavy metals sorbed to the suspended particulate fraction is presently poorly understood.

Petroleum Hydrocarbons in the Water Column: Seawater samples in the study area were found to be less than one part per billion in petroleum hydrocarbons. Surface tows made in Cook Inlet yielded low background tar levels. Drift bottle studies, however, conducted by the Alaska Department of Fish and Game in 1978 suggest significant amounts of tar in the inlet. Approximately 7 percent of the drift bottle returns were coated with tar. The quantitative significance of drift bottle studies is limited because of the differing and unknown residence times of the bottles in the water, contact with beach tar deposits, relocation along the beach, and reporting bias due to differences in human population densities and activities along the coastline.

Concentrations of hydrocarbons in the water column below an oil slick can be expected to be approximately 200 parts per billion and perhaps relatively uniformedly distributed down to about 50 meters. It could be assumed that oil which comes in contact with suspended particulate material could be eventually transported to the bottom. Concentrations of hydrocarbons on the bottom could be approximately .025 gram of oil per gram of detritus.

B. Biological Characteristics

1. Vulnerable Coastal Habitats: This discussion summarizes a portion of the description of the affected environment contained on the back of graphics 1 through 4. Visual information is shown on graphic 2.

This section focuses on coastal habitats, which almost entirely surround this proposed OCS lease area. Some of the important coastal habitats include the kelp beds on shallow-water banks in which sea otters feed, the streams and estuaries in which salmon spawn, and the intertidal region. These habitats are described in this section; the likelihood of accidental oilspills impacting these habitats, and persistence of oil in these habitats, will be described later.

Descriptions of the biota and food webs have been analyzed by Dames and Moore (1975, a and b), by Palmisano and Estes (1977), and by Lees (1978).

Evidence from California and the Aleutian Islands indicates that the sea otter is a key species in determining the structure of nearshore communities. In areas with dense sea otter populations, sea urchins, limpets, and chitons are reduced to sparse populations of small individuals; macroalgae flourish, providing food and shelter for a variety of organisms, especially crustaceans; wave exposure is reduced, siltation is increased, and overall productivity is high. In contrast, similar areas with few or no sea otters have dense populations of large herbivores; macroalgae are severely overgrazed; bare rocky substrates are exposed to wave action; and overall productivity is low.

The lowest reaches of the rocky intertidal and nearshore eelgrass beds are critical to the life cycle of such commercially important species as the king crab, Paralithodes camtschatica and Dungeness crab, Cancer magister.

The nearshore region of lower Cook Inlet is also an important spawning area for several commercially important pelagic, demersal, and anadromous fish species. In the summer, maturing salmonids congregate at the mouths of natal streams before migrating upstream to spawn. In late spring and summer, Pacific herring, chum and pink salmon, and some demersal species spawn in intertidal and shallow subtidal regions. Some flatfish are thought to spawn near shore in lower Cook Inlet in winter and spring.

The kelp and macroalgae beds, as well as providing habitat for sea otters, provide a substrate on which herring spawn. Both the herring and their roe (herring eggs) are quite valuable commercially (section III.B.2).

Other shallow-water organisms that are commercially valuable are the razor clam and scallop. The distribution in lower Cook Inlet and Shelikof Strait of these organisms in commercially exploited quantities and/or areas of dense concentration is shown on graphic 2. The distribution of both scallops and razor clams is based on information from the Alaska Department of Fish and Game (1978).

The vulnerable coastal habitats have been outlined in the previous paragraphs. The probability of these habitats being impacted by oilspills is described in section IV.A.1.d. The persistence of spilled oil in these habitats is described in section IV.A.1.e., and the possible effects on the biota are described in section IV.A.2.a.

2. Commercial and Sportfish: Refer to graphics 2 through 8 of this FEIS for visual information and the back of graphics 5 through 8 of this FEIS for descriptive text.

3. Marine and Coastal Birds: This discussion summarizes a portion of the description of the affected environment contained on the back of graphics 9 through 12. Visual information is presented on graphic 10.

At least 100 species of marine and coastal birds numbering several million occur in the proposed sale area. Among the marine species, the sooty and short-tailed shearwaters (Puffinus griseus and P. tennuirostris) are the most dominant species during the summer in the offshore areas, while the most abundant nesting species are common murres (Uria aalge), tufted puffins (Lunda cirrhata), forked-tailed storm petrels (Oceanodroma furcata), black-legged kittiwakes (Rissa tridactyla), and glaucous-winged gulls (Larus glaucescens).

There are at least 60 seabird colonies in the lower Cook Inlet area and 120 colonies in the Shelikof Strait area (see graphic 10). At least 30 species of seabirds and waterfowl, numbering in the tens of thousands, overwinter in ice-free bays and inlets of both Shelikof Strait and lower Cook Inlet. The Whale Passage/Afognak Strait area and Kachemak Bay are the most important winter concentration areas. Murres, crested auklets (Aethia cristatella), and several species of sea ducks, which are all species highly vulnerable to oil pollution, represent the predominant wintering birds in these areas.

The major food sources of the bird species predominant during the spring and summer include capelin, sand lance, euphausiid crustaceans, squid, and pollock. Various benthic invertebrates and demersal fish are winter food sources.

Several million migrant waterfowl, including ducks, geese (including the rare tule goose), swans, and many species of shorebirds, either stop over at several staging areas along the coast of lower Cook Inlet or nest in the coastal marshlands. Some of these important staging and nesting areas include inner Kachemak Bay, Tuxedni Bay, Redoubt Bay (habitat of the rare tule goose), Douglas and Kenai River flats, Drift River, Chinitna Bay, Iliamna Bay, Ursus Cove, Iniskin Bay, and other coastal areas in lower Cook Inlet.

Several species of shorebirds, including oyster-catchers, plovers, turnstones, sandpipers, phalaropes, and two major coastal birds of prey; the bald eagle (Haliacetus leucocephalus) and the peregrine falcon (Falco peregrinus), feed and nest along the coast of the proposed sale area. Significant populations of bald eagles and peregrine falcons occur year-round in the sale area.

4. Marine Mammals: This discussion summarizes a portion of the description of the environment contained on the back of graphics 9 through 12. Visual information is shown on graphic 11.

Section III.B.4. on the back of graphics 9 through 12, addresses in detail the natural history, distribution, and abundance of the northern fur seal, Steller sea lion, harbor seal, and sea otter as relevant to the proposed sale area. Evidence to date indicates that the bulk of the fur seal population migrates east of Kodiak Island and the Kenai Peninsula in the Gulf of Alaska although an unknown portion of this population occurs seasonally in Shelikof Strait. Steller sea lions are particularly abundant near and in the proposed sale area with major breeding rookeries located at Sugarloaf and Marmot Islands. These two rookeries alone contribute close to half of the entire sea lion productivity in the Gulf of Alaska. Movements of large segments of the sea lion population may occur throughout the Shelikof Strait area. Harbor seals occur throughout the coastal zone of lower Cook Inlet and Shelikof Strait. Major concentrations (including breeding animals and pups) occur on Augustine Island, Shuyak Island, northern Afognak Island, several locations along the east and west shorelines of Kodiak Island, and the largest known concentration in the world at Tugidak Island. Sea otter concentrations occur in several important areas including the Barren Islands, Shuyak-Afognak Islands, Kamishak Bay, and the Trinity Islands. The waters of the northern Kodiak Archipelago are habitat for as many as 3,000-6,000 sea otters and represent an important source of animals from which range expansion is occurring, as do certain other habitats occupied at present.

Errata: Section III.B.4. on the back of graphics 9 through 12.

- * Paragraph 1, line 11: change Eumotopia's to Eumetopia's.
- * Sea Otter, paragraph 1, last sentence. Change 2,000 to 3,000.

5. Endangered Species and Non-Endangered Cetaceans: This discussion summarizes a portion of the description of the affected environment contained on the back of graphics 9 through 12. Visual information is shown on graphic 12.

Section III.B.5., on the back of graphics 9 through 12 addresses in detail the natural history, distribution, and abundance of endangered species and non-endangered cetaceans.

There are at least 17 cetacean species which may occur in the proposed sale area. Seven of these species and one avian species are considered to be endangered. Listed (Federal Register, vol. 44, No. 12) endangered species which may occur in the proposed sale area include the gray whale, humpback whale, fin whale, sei whale, blue whale, sperm whale, right whale, and the Aleutian Canada Goose.

Other species listed as endangered may occur in various locations of the Gulf of Alaska or are possible transients through southcentral Alaska, including the peregrine falcon (*Falco peregrinus anatum* and *F. p. tundrius*) and short-tailed albatross (*Diomeda immutabilis*). None of the latter species are known to make significant use of or have been recently reported in or near the proposed sale area.

Of the endangered whales, gray, fin, humpback, and, possibly sei whales are most likely to occur in or near the proposed sale area on a seasonal basis. Recent observations of Aleutian Canada geese have been reported in the Semidi Islands which suggests that migrants may pass to the south of Kodiak Island. There have been no sightings of this species by researchers conducting marine bird and waterfowl surveys in lower Cook Inlet and Shelikof Strait.

Non-endangered cetaceans most likely to occur in or near the proposed sale area include beluga, killer, and minke whales; harbor porpoise, and Dall porpoise.

Errata: Section III.B.5. on the back of graphics 9 through 12.

- Paragraph 1, line 29, change novaenoline to novaeangline.
- Blue Whale: Paragraph 1, line 17, insert "to" between "Alaska" and "Vancouver."
- Right Whale: Paragraph 1, line 10, change "western" to "eastern."
- Northern Right Whale Dolphin: The heading and material after it should come before the material at the top of the column.
- Aleutian Canada Goose: Insert after line 17 "The fall population in 1977 was estimated to be 1,600 geese."
- Beluga: Paragraph 3, first sentence, change "an unknown number" to "an unknown but substantially larger number."
- Killer whale: Paragraph 1, sentence 2, "Scheffer (1972) estimated..." Delete entire sentence. Paragraph 3, last sentence, delete "such as near sea lion or other marine mammal rookeries."

6. Terrestrial Mammals: This discussion summarizes a portion of the description of the affected environment contained on the back of graphics 9 through 12. Visual information is shown on graphic 9.

About 38 species of terrestrial mammals occur in the coastal habitat of the sale area. Eleven of these species utilize the marine resources regularly: river otter (Lutra canadensis), brown bear (Ursus arctos), black bear (Ursus americanus), red fox (Vulpes fulva), arctic fox (Alopex lagopus), wolf (Canis lupus), coyote (Canis latrans), mink (Mustella vison), wolverine (Gulo luscus), moose (Alces alces), and Sitka black-tailed deer (Odocoileus heinionus sitkensis). In the proposed sale area the brown bear, the Sitka black-tailed deer, the river otter, and the red and arctic foxes utilize the coastal beaches, tidal habitat or nearshore waters most frequently. Brown bear rely heavily on coastal beaches during the spring for carrion, and depend primarily on salmon runs during the summer and fall, especially on Kodiak Island. The Sitka black-tailed deer on Kodiak Island depends primarily on beaches and other coastal habitat during the wintertime. River otter commonly occur in coastal waters, on beaches, and tidal habitats, while red and artic fox frequently hunt along the shoreline and beaches of the proposed sale area.

C. Social and Economic Components

1. Social Factors:

a. Population: This discussion summarizes a portion of the description of the affected environment contained on the back of graphics 13 through 16.

The history of human habitation of the Kodiak Islands and the coasts of Cook Inlet date back at least 2,000 years when the area's original inhabitants, the Aleut and Chugach Eskimos, and later the Koniag and Kenaitze Indians established permanent settlements in the area. The more recent history of settlement in the area, stimulated by the growth of the fishing industry, homesteading, tourism, and more recent military and oil and gas populations have added new towns and predominant industries to the area. The present population of the area consists of approximately 22,000 residents in three towns and a number of villages and unincorporated areas of the Kenai Peninsula Borough, and approximately 9,000 residents of Kodiak Island located in Kodiak City and six villages, as well as scattered unincorporated settlements within the Kodiak Island Borough.

b. Community Infrastructure: This discussion summarizes the description of the affected environment contained on the back of graphics 13 through 16.

Local government, housing, water services, sewer services, solid waste disposal, electrical power, fire protection, police protection, communications, health services, and education were covered in this discussion. The communities discussed include Kenai, North Kenai, Soldotna, Homer, Kodiak, and Port Lions.

There is a wide range of disparity among these communities for each of the various topics, some communities having adequate supplies or services and others inadequate. For example, the central peninsula area has an adequate housing supply and an inadequate water supply. Port Lions, on the other hand, has an inadequate housing supply and an adequate water system. Kodiak has both an inadequate housing supply and water service.

c. Sociocultural Systems: This discussion summarizes a portion of the description of the affected environment contained on the back of graphics 13 through 16.

Kodiak City depends on the sea for its livelihood, income, and way of living. Fishermen and most other residents of Kodiak are socially, politically, and economically organized around the fishing seasons and the fishing industry. In 1977, for example, 2,489 people worked in Kodiak area canneries, while over 1,100 Kodiak residents held commercial fishing licenses. Fishing crew, Coast Guard, other State and Federal agency support services, tourism, and other economic, social, and political activities are all interdependent with and supportive of the fishing industry in Kodiak.

Approximately 15 percent of Kodiak's population is Aleut, Eskimo, or Indian, according to 1970 census reports. Russian, Scandinavian and Filipino populations and cultures are also important within the Kodiak community. Racial conflict occasionally flares here. Other conflict tends to be associated with or result from characteristics of fishermen and their families, particularly the demands of Kodiak's fisheries, including long hours out, danger, and risk.

The villages of Shelikof Strait depend on the sea for both subsistence and cash. These relatively isolated Aleut settlements have long maintained a distinctive Aleut-Russian culture and way of life that they value highly and want to maintain. Each village is composed of from one to three extended families who are socially, economically, and politically organized around subsistence and commercial fishing, hunting, and gathering activities. Port Lions is a merger of the former village of Afognak and the former Port Wakefield independent fishing fleet at the Port Wakefield site. It is somewhat larger, more diverse culturally, and more prosperous than villages located along the coast of Shelikof Strait.

The sociocultural systems of the lower Cook Inlet area are somewhat more varied than are those on Kodiak Island. A system of roads connects most of the towns and unincorporated areas of the Kenai Borough. English Bay, Port Graham, and Seldovia across Kachemak Bay are exceptions, being accessible only by air and sea.

Homer is a fishing, recreational, and subsistence-oriented hub, as are the unincorporated communities close by, including Ninilchik and Anchor Point. Kenai, on the other hand, considers itself the "oil capital of Alaska" while at the same time maintaining a substantial commercial and recreational fishing industry. Soldotna's economy and social system have grown out of government and university populations and residential developments catering to the Kenai-Nikiski oil workers. Homesteaders were earlier settlers of all these communities.

The villages of English Bay and Port Graham are long established Aleut-Russian villages with a fishing-subsistence way of life and close-knit extended family systems. Seldovia, too, is a small fishing community, but its residents are now less involved in subsistence activities and more dependent upon fishing incomes than formerly. As in the case of Kodiak Island, numerous families maintain a subsistence way of life outside the boundaries of established communities in and around Kachemak Bay and lower Cook Inlet.

Errata: Section III.C.1.c. on the back of graphics 13 through 16.

- * The source of Cook Inlet sociocultural information is Braund, S. R. and Behnke, 1980.
- * Port Lions, 2nd paragraph, last sentence, substitute the following: "During local discussions here, it was learned that community opinion about OCS has shifted somewhat. In contrast to villages located along the coast of Shelikof Strait, Port Lions is actively encouraging well planned, orderly growth consistent with current lifestyles, community goals, and a community size of 400-500 people."
- * Lower Cook Inlet: 3rd paragraph, last sentence should read: "The presence of a cannery in Port Graham provides more cash in this village's economy and may account for the more extensive subsistence use range (see graphic 14 of the 60 DEIS) utilized by Port Graham residents."

d. Subsistence: This discussion summarizes a portion of the description of the affected environment contained on the back of graphics 13 through 16.

According to Alaska Statutes, "subsistence uses" are those customary and traditional uses in Alaska of wild renewable resources for direct personal or family consumption (AS Sec. 16.05.940). Subsistence use of local resources is very important to local Kodiak Island and lower Cook Inlet people. Several villages along Shelikof Strait are primarily organized around subsistence activities, supplemented by commercial fishing incomes. These are the villages of Karluk, Larsen Bay, Ouzinkie, and Port Lions. In Cook Inlet, the villages of English Bay and Port Graham are primarily subsistence-oriented communities. Table III.C.1.d.-1 lists resources of these six villages, which are used as part of the present yearly subsistence cycle. In addition to these villages, significant subsistence dependence also exists in Homer, Seldovia, Ninilchik, and Anchor Point, as well as in the scattered rural residences outside the towns and villages of the area. Subsistence information is illustrated on graphic 14.

Errata: Section III.C.1.d. on the back of graphics 13 through 16.

- * Table III.C.1.d.-1, Source of information: KANA and Alaska OCS Office, 1980.
- * Table III.C.1.d.-2, Source of information: North Pacific Rim, Inc. 1980.
- * Add the following paragraph to the end of the discussion of lower Cook Inlet: "For a more complete discussion of the cultural meanings and organization associated with subsistence, subsistence cycles and village life in Cook Inlet and Kodiak, see Braund and Behnke, 1980 and Davis, 1980. Also, refer to Native Livelihood and Dependence, Field Study 1, June, 1979, for a discussion of subsistence cycles and primary and secondary resource designations."

2. Economy: This discussion summarizes a portion of the description of the affected environment contained in appendix Q and is limited to the local areas of Kodiak and the central and southern Kenai Peninsula. State, regional, and some non-Kodiak or non-Kenai descriptions are not presented because of the minimal impact of sale 60 on the respective areas. Detailed information from which this abstraction is made was provided from the University of Alaska, Institute of Social and Economic Research (1978 and 1980), and Alaska Consultants, Inc. (1979).

Table III.C.1.d.-1
Subsistence Resource Summary Shelikof Strait Villages

Resource	Karluk	Larsen Bay	Ouzinkie	Port Lions
Finfish				
Sockeye Salmon	1	1	1	1
Chinook Salmon	2	1	1	2
Coho Salmon	1	2	1	1
Pink Salmon	1	1	1	1
Chum Salmon	2	2	2	0
Herring	2	2	0	2
Halibut	2	1	1	1
Cod	0	1	2	2
Flounder	1	1	2	2
Bass	2	1	0	0
Trout	1	1	2	2
Fish Eggs	2	2	2	2
Shellfish				
Clams	1	1	2	2
Octupus	2	2	2	0
Shrimp	0	2	1	2
Prawns	0	2	1	2
"Beach Food"*	2	2	2	2
King Crab	2	2	1	1
Tanner Crab	2	2	2	0
Dungeness Crab	2	2	1	1
Sea Mammals				
Seal	1	1	1	0
Sea Lion	2	1	2	0
Land Mammals				
Deer-Elk	1	1	1	1
Rabbit	1	1	1	1
Ptarmigan	1	1	1	1
Ducks	1	1	1	1
Geese	0	0	0	0
Bird Eggs	2	2	0	0
Vegetation				
Salmonberries	2	2	2	2
Cranberries	2	2	2	2
Other berries	2	2	2	2
Other vegetation	2	2	2	2

0 = Rarely utilized/occurring
1 = Primary Subsistence Resource
2 = Secondary Subsistence Resource

*Includes sea urchins, chitons, and other small shellfish found at low tide.

The most important economic sector in Kodiak is commercial fishing and fish processing, both in terms of employment and investment. Other significant economic activities include tourism and recreation, the wood products industry, and the U.S. Coast Guard base. Future growth in these industries and others will be influenced to a large part by the actions of the Regional Native Corporations. Villages in the Kodiak region are principally involved in commercial fishing and to some degree in timber operations. It is not anticipated that the sources of livelihood or the character of these villages will change in the foreseeable future. In contrast to villages located along the coast of Shelikof Strait, Port Lions is actively encouraging well planned, orderly growth consistent with current lifestyles, community goals, and a community size of 400-500 people.

The Kenai/Cook Inlet census division economy is significantly different from that of Kodiak. The economic base of this region is principally the oil and gas industry followed by commercial fishing and fish processing, tourism and recreation, and the wood products industries. The geographic distribution of the industries is roughly as follows. The Kenai/Nikiski area is the center of the oil and gas related industries, and is the support base for petroleum activities in Cook Inlet. This area would also support development of the oil and gas resources in the Kodiak/Shelikof Strait region, if such development occurs. Soldotna, lying southeast of Kenai, is the center for government and education. A significant number of oil industry workers also live in Soldotna. Kenai Peninsula communities such as Ninilchik, Homer, and Seldovia are relatively strongly tied to the commercial fishing industry and have incurred rather substantial growth in the tourism and recreation sectors in recent years.

3. Cultural Resources: This discussion summarizes a portion of the description of the affected environment contained on the back of graphics 13 through 16. Visual information is shown on graphic 13.

The shoreline surrounding the proposed lease area has numerous cultural resources of prehistoric and historic value. The predominant types of prehistoric resources found on the shores near the proposed sale area are housepits containing the household and subsistence artifacts (stone lamps, sinkers, arrowheads, etc.) of early people. Rock carvings and rock painting are also found. Historic artifacts found onshore near the proposed lease area consist of early Russian houses, roadway inns, fish camps, mining camps and other reminders of historic times. There is a high probability that archeological sites occur in some blocks in the proposed lease sale area. Submerged artifacts, if found, would be similar to those listed above (burins, stone arrowheads) and would have been scattered by tidal currents and geologic changes (David Hopkins, 1967). It is estimated that less than 1 percent of all rig emplacement surveys would locate these artifacts because only rather large anomalies, 1 meter or larger, can be distinguished with side-scan sonar.

Magnetometers detect only metal objects and these, if found, would most likely be from historical objects. It is estimated that less than 2 percent of all surveys for rig emplacement might locate a sunken ship within the boundaries of the sale area.

Errata: Section III.C.3. on the back of graphics 13 through 16.

- * Replace the historical sequence that appears in paragraph one with the following:

Koniak (Kodiak)
1000 A.D. to Contact

Kachemak (I, II, III Central South Alaska)
800 B.C. to 1000 A.D.

Three Saints Bay (Kodiak)
100 B.C. to 1000 A.D.

Old Kiavok (Kodiak)
1300 B.C. to 100 B.C.

Ocean Bay II (Kodiak)
2500 B.C. to 1300 B.C.

Ocean Bay I (Kodiak)
4500 B.C. to 2500 B.C.

4. Visual, Wilderness, and Recreation Resources: This discussion summarizes a portion of the description of the affected environment contained on the back of graphics 13 through 16. Visual information is shown on graphic 15.

Visual, wilderness, and recreation resources of the Kenai Peninsula, Kodiak Island, and the Alaska Peninsula are described. Visually, each area is varied and outstanding. Rugged mountains, forest, grassy areas, lakes, rivers, and coastline characterize each area. The Alaska Peninsula is famous for its volcanoes. Each area is well known for its wildlife, be it moose, brown bear, black bear, or birds.

Each area contains vast acreage of what most would term "wilderness." Practically all of the Alaska Peninsula and most of Kodiak Island are roadless. The Kenai Peninsula contains a road system that seems extensive in comparison.

Outdoor recreation not only draws people to vacation in Alaska but is an extremely important ingredient in the lifestyle of most Alaskans. Sightseeing, fishing, hunting, boating, camping, photography, berry picking and other food gathering, cross-country skiing, wildlife viewing, hiking, and snowmobiling are among the available recreation opportunities. Fishing is the most popular recreational activity (Alaska Department of Fish and Game, 1979). The Kenai Peninsula is accessible to the greatest number of people and is much more highly utilized for recreation than the Alaska Peninsula or Kodiak Island.

Errata: Section III.C.4. on the back of graphics 13 through 16.

- * The Kenai River should be included as one of several areas that are used heavily for recreation.
- * All material describing recreational use of the Katmai National Monument was obtained through telephone contact with National Park Service personnel at the monument.

* All "areas of particular concern" along the coast of the Alaska Peninsula, as identified by the Alaska Department of Natural Resources (1978, 1979), are depicted on graphic 15. In addition to the "areas of particular concern" shown on the graphic, there are numerous areas on Kodiak Island and the Kenai Peninsula which are described in two reports by the Alaska Department of Natural Resources (1978, 1979), but are not shown on graphic 15. Since sufficient recreation information exists for these two areas for the purposes of this environmental statement, the "areas of particular concern" are not shown on the graphic. For a complete description of all "areas of particular concern," refer to the Alaska Department of Natural Resources' reports cited above.

5. Land Status and Land Use: This discussion summarizes a portion of the description of the affected environment contained in appendix R. Existing land status and land use is depicted on graphic 8. The graphic shows land status and land use patterns for upper and lower Cook Inlet, the Kenai Peninsula, Kamishak Bay, the Alaska Peninsula, and portions of the Kodiak Archipelago facing the Shelikof Strait portion of the leasing proposal.

Land status topics include Federal and State land ownership and Native land selections and interim conveyances under the Alaska Native Claims Settlement Act (ANCSA). Also discussed are the various monument actions under the Antiquities Act and the withdrawals under the Federal Land Policy and Management Act (FLPMA). State public interest lands on the Kenai Peninsula lowlands are identified and a tabulation of Native corporation land status under ANCSA is portrayed. Existing land use in the coastal zone of the proposed sale area is described for developed portions of the Kenai Peninsula lowlands. Approved land use plans for incorporated communities in the coastal zone of the proposal are identified and discussed. Plans are described only for those communities the land status or land use of which may be affected by the petroleum development scenario set forth in the leasing proposal. These communities include the cities of Kenai, Homer, Anchor Point, Ninilchik, and Port Lions.

Additionally, approved management plans for the Katmai National Monument, the Kenai National Moose Range, and the Corps of Engineers' Kenai River Review are described. Interim management regulations for the national monuments and FLMPA areas are identified; however, permanent land use plans for these areas have yet to be prepared.

Errata: Section III.C.5. of the DEIS (appendix R of this FEIS).

* The city of Port Lions has adopted an Industrial Development Plan (1980) since publication of the DEIS. The DEIS acknowledges industrial land uses contemplated in an earlier comprehensive plan of 1975 (Galliet and Silides, 1975). A specific area of land presently zoned for industrial uses is on the Peregrebni Peninsula and consists of 60 acres. The plan indicates that industrial land use and development decisions will be made by the city on an individual project basis in accordance with the city's overall planning goals and policies.

  The industrial land uses allowed by the Port Lions Industrial Development Plan are not explicitly identified. The plan summary indicates that "the community has the resource potential to support a seafood processing industry, timber industry, marine services industry, and possibly a marine service base for offshore oil and gas exploration, but with some reservations in the community's attitude towards development." The plan summary additionally states that:

> "An assessment of Port Lions' location, history, present economy, community goals, facilities and services, clearly points to the conclusion that Port Lions would be an excellent site for the development of a marine industrial park which might include seafood processing, by product processing, marine gear and boat repair and storage, or marine sales and services."

* The city has additionally prepared and adopted a Port Lions Comprehensive Parks and Recreation Plan (1979). The plan identifies nine parklands which are important to the city as recreational opportunities. The parklands comprise eight small areas in proximity to the village, and one large reserve on Peregrebni Peninsula. Two of the parklands are scheduled to be conveyed to the Afognak Native Corporation, and one area is located on private property. The parklands identified in the plan include Lukin Park, Boskofsky Park, Agick Park, Larsen Beach North, Knagin Beach South, Naumoff Park, Pestrikoff Lagoon, Noya Park, Petersen Park, and Nelson Park. The locations of the parklands are identified on a reference map which accompanies the plan.

6. Transportation: This discussion summarizes a portion of the description of the affected environment contained in appendix S.

a. Kodiak Archipelago: Port Lions, a city hypothesized as an area of possible onshore development, lies some 26 air kilometers (17 mi) northwest of the city of Kodiak. The town has no overland communications with any part of Kodiak and relys entirely on air and water transport for resupply and passenger movement.

Air service to Port Lions is facilitated by a State-maintained 808-meter (2,650 ft) gravel runway. Marine activities at Port Lions are serviced by two docks. The largest pier (the former Wakefield cannery dock) is an L-shaped structure which extends some 305 meters (1,000 ft) into Port Wakefield before assuming a right angle. The second pier is a floating dock which is joined to the cannery dock. The floating dock provides 22 berths for fishing vessels with a total of 244 meters (800 linear ft) available for docking space.

b. Anchorage: The city of Anchorage is the primary transportation center in Alaska. It is an important stop for the Alaska Railroad; it has access to a major north-south, year-round highway; it is serviced by an international airport; it has the State's most extensive dock facilities; and it has the largest market area in the State. Any development activity that occurs within Alaska will probably affect the social, economic, and transportation system of the city of Anchorage.

c. Cook Inlet: Unlike the western shore of the inlet, which has no roads, potential oil and gas facility sites on the Kenai Peninsula are all located near primary vehicle routes. These routes connect the Kenai Peninsula with Anchorage and the rest of southcentral Alaska.

Scheduled air service is conducted through both Kenai and Homer airports. Either airport can handle jet traffic and both are operating well below flight capacity. The Homer airport, however, is in need of improvement in regard to passenger facilities.

The marine terminals in Cook Inlet which may be affected by proposed sale 60 related activities are principally those of Nikiski and Homer. The Nikiski facilities are more than adequate to handle exploratory and development activities. The most used facility would be the Rig-Tenders dock. This facility was built by the Crowley Maritime Corporation for the dedicated use of the oil industry. It is from this dock that existing upper Cook Inlet platforms are serviced. The Homer port facilities are currently adequate to accommodate OCS-support boat activities. Existing Homer port facilities are located at the end of Homer Spit in Kachemak Bay. The Homer city pier extends some 140.2 meters (460 ft) from shore and can serve vessels drawing 7.6 meters (25 ft) of draft.

D. Coastal Zone Management

Appendix T is summarized as follows.

The State of Alaska has a coastal management program approved by the U.S. Department of Commerce. The State program requires local government in the coastal zone to participate in the program through adoption of a district Coastal Management Program (CMP). The State program includes policies on siting of energy facilities in the coastal zone as a use of State concern.

The Kenai Peninsula Borough is currently preparing a district CMP. At the time the DEIS was prepared, the Borough plan was not completed. The DEIS assumed hypothetical energy facility siting policies based upon other documents and studies sponsored by the Borough. The DEIS also identified two proposed "Area Meriting Special Attention" designations in the coastal zone of the Kenai Peninsula. The energy facility sites identified by the Borough are generally the same locations identified in an earlier FEIS on proposed OCS sale CI (DOI, 1977). These sites include the following: oil terminals at Cape Starichkof, Trading Bay, and Nikiski; LNG terminals at Nikiski and Cape Starichkof; support supply facilities at Homer, Kenai, Nikiski, Cape Starichkof/Anchor Point, and Seldovia; and processing and treatment facilities at Drift River, Trading Bay, Cape Starichkof, and Nikiski.

The Kodiak Island Borough is currently preparing a district CMP. At the time of DEIS preparation on proposed OCS sale 60, the Borough's plan was not completed. The DEIS assumed hypothetical energy facility and siting policies based upon other documents and studies sponsored by the Borough. Unfortunately, these prior studies did not treat the Shelikof Strait portion of the proposal. The Borough did adopt a policy statement that OCS-related facilities should not be located around population centers and should be sited at self-sustaining and remote locations.

Errata: Section III.D. of the DEIS for proposed sale 60 (appendix T of this FEIS).

* Since preparation of the DEIS, the Kenai Peninsula Borough has released a draft version of its district CMP. The recommended energy and industrial

facility sites identified in the draft plan are essentially the same as those previously discussed in the DEIS on the OCS leasing proposal. The draft CMP does identify an additional potential OCS service base at Port Naskowhak across from Seldovia in Kachemak Bay.

* Since preparation of the DEIS, the Borough has officially adapted a Ports and Harbors Master Plan, that includes a short-range action plan for port and harbor development. Section III.D. of the DEIS presented findings of a Department of the Interior report in this planning effort that pertained to energy facility siting in the coastal zone. Those findings include options regarding OCS facility siting. These options have been adapted as policy recommendations in the Final Ports and Harbors Master Plan.

E. Water Quality

The following summarizes information presented in the DEIS (see appendix U of this FEIS). A summary of the existing framework of Federal water quality management is provided. Existing water column concentrations of toxic trace metals in the sale area are shown to be below applicable Federal water quality criteria. Dissolved hydrocarbon concentrations in the water column in the sale area are also provided. Difficulties with hydrocarbon measurement techniques and selection of the toxic aromatic fractions are discussed in context of the Alaska Department of Environmental Conservation (DEC) requirements. From the available data, dissolved aromatic hydrocarbon concentrations in upper Cook Inlet, near producing platforms and treatment facilities, are below applicable water quality criteria.

No local data are available on the concentrations of synthetic, or organic chemicals in the waters of the proposed sale area. The existing levels of these toxic substances are presumed to be extremely low given absence of major industrial sources of discharge in Alaska.

Existing waste water discharges in upper Cook Inlet are several. For the most part, these discharges are comprised of sanitary wastes and urban run-off from coastal communities. Exceptions to these coastal discharges would be treated waste water discharge from producing oil and gas platforms in upper Cook Inlet and ballast water discharge transportation sources.

Errata: Section III.E. of the DEIS for proposed sale 60 (appendix U of this FEIS).

* Subsequent to the publication of the DEIS, the U.S. Environmental Protection Agency (EPA) promulgated final rules on Ocean Discharge Criteria under section 403(c)(1) of the Clean Water Act as amended. At the time of DEIS preparation, EPA's rules were not promulgated (correction to page 102, DEIS).

* Also on page 102 of the DEIS, the State water quality standard for petroleum hydrocarbons was erroneously described as not applying to marine sediment quality. The applicable state standard reads in part "There shall be no concentration of hydrocarbons, animal fats, or vegetable oils in the sediment which causes deleterious effects to aquatic life" (Alaska Department of Environmental Conservation, 1979).

- The first paragraph, second sentence on page 105 of the DEIS, should be corrected to read "assuming an LD 50 effect at 1 ppm,... 0.01 of this value, or 10 ppb,...."

- The discussion of aromatic hydrocarbons in upper and lower Cook Inlet waters on page 104 of the DEIS is expanded to include the following paragraphs. These should follow paragraph 4 on page 104.

  "The State of Alaska Department of Environmental Conservation has applied its aromatic hydrocarbon criteria to continuous low level releases from discharge sources. This State is more interested in identifying and evaluating the chronic and sublethal effects of aromatic hydrocarbons as it does not expect permitted discharge levels to result in acute or toxic concentrations to marine biota."

  "Investigators have suggested that more complex monoaromatic and diaromatic compounds may play a larger role in toxicity. This means that compounds in low concentrations may have significant effects on sensitive organisms. Since these compounds are less volatile, and therefore have a longer residence time, their influence may also be greater."

F. Air Quality

The following summarizes information presented in section III.F. of the DEIS for proposed sale 60 (see appendix V of this FEIS). The proposed sale area is located in the Cook Inlet and Southcentral Alaska Intrastate Air Quality Control Region (AQCR). Ambient air quality in the Cook Inlet AQCR was reported by the U.S. Environmental Protection Agency (EPA) to be in compliance with all of the national Ambient Air Quality Standards, with the exception of total suspended particulates and carbon monoxide in the Anchorage area only. Under the Prevention of Significant Deterioration Provisions of the Federal Clean Air Act, the Tuxedni National Wildlife Range (NWR) on the west side of Cook Inlet has been designated as a Class I area. No ambient air quality monitoring is available at or near the Tuxedni National Wildlife Refuge to establish its "baseline" air quality.

G. BLM Studies Programs

1. Environmental Studies Program: In each OCS area proposed for gas and/or oil development, extensive environmental studies are conducted before such development is allowed. As manager of the Outer Continental Shelf Leasing Program, the Bureau of Land Management (BLM) of the Department of the Interior (DOI) initiated the Outer Continental Shelf Environmental Assessment Program (OCSEAP) as an essential part of its management responsibility. The environmental studies program is conducted under interagency agreement between BLM and OCSEAP offices of the National Oceanic and Atmospheric Administration (NOAA), Department of Commerce (DOC).

In 1974, BLM requested NOAA to initiate an environmental assessment program in northeastern Gulf of Alaska and eight additional Alaska Outer Continental Shelf areas. A studies program for lease areas and some nonspecific study areas in Alaska were planned. This program assembled historical data about the Alaskan Outer Continental Shelf and addressed new study needs to provide a basis for assessment of pretroleum exploration and development impacts.

Major study efforts began in 1975 in the Gulf of Alaska, including the Kodiak area. In 1977, studies began in the lower Cook Inlet/Shelikof Strait sale area 60. These studies were broad-scale surveys and produced information defining circulation patterns, seafloor faults, seismic activity, unstable sediment areas, critical habitats, and biological populations. Baseline data for hydrocarbon and trace metal concentrations were also provided. Special studies were intensified in fiscal year 1978 to fill data gaps in nearshore processes and to determine possible environmental impacts due to OCS development.

2. Objectives of the Alaska OCS Environmental Assessment Program: In July 1979, the Alaska OCS Office received an Interim Synthesis Report on the Cook Inlet/Shelikof Strait from Science Applications, Inc., through OCSEAP. The report contains considerable descriptive information on the affected biological and geophysical environment and represents a comprehensive encyclopedia for environmental information.

a. Contaminant Distribution: Marine chemistry efforts began in 1975 in the Gulf of Alaska and on the Kodiak Shelf. In 1977, contaminant studies were initiated in lower Cook Inlet/Shelikof Strait. These studies were intended to establish predevelopment hydrocarbon and trace metal concentrations along carefully designed station grids.

A significant part of the 1977 marine chemistry program was directed towards process orientated studies. These studies were designed to give insight into processes that control hydrocarbon distributions in the Alaska OCS and to answer questions of seasonal variability of pollutant concentrations in water, biota, and sediments due to biological activity or petroleum exposure. Rig monitoring studies of toxicity of drilling fluids and cuttings on commercial shellfish was begun in FY 80. The results of these studies will be available in 1981.

b. Geologic Hazards: Geologic hazards to petroleum-related activities center around seismicity, surface, and near-surface faulting, sediment instability, erosion and deposition, and stratigraphy.

Many hazards present in Alaska lease areas also occur in other U.S. shelf areas; however, in Alaska, these problems are unique in terms of severity and complexity. A knowledge of the nature, frequency, and intensity of severe environmental events is essential.

Seismic field studies began in fiscal years 1975 and 1976 to supplement existing studies being funded by other agencies. The Bureau of Land Management is directly supporting part of the seismic program in an ongoing Geological Survey study, employing a land-based network of seismographic stations. All geohazard studies conducted by the University of Alaska have been funded through BLM/OCSEAP. The major objectives of these seismic studies are to determine a probability scale for earthquake hazards and to improve the statistical reliability of the existing data base. This is accomplished through continuation of present observational programs and use of additional or improved instrumentation, such as ocean-bottom seismometers and strong motion accelerometers. Sufficient geohazard information is available on Cook Inlet; an interim geohazards evaluation of Shelikof Strait will be available prior to the proposed lease sale 60.

Shelf faulting, and sedimentation studies are conducted in order to define potential hazards so that environmental risks can be minimized by out-right avoidance or by appropriate regulation of facility siting, design, and construction. Certain geologic features, identified as potentially troublesome during regional reconnaissance of the proposed lease area, are studied in further detail. The regional reconnaissance phase requires about a 2-year study effort. Focused studies on special problems take an additional 2 to 3 years. These are time estimates which vary depending upon the proposed lease area size, geological complexity, and nature of the identified hazards.

Shelf faulting and sedimentation studies began in fiscal year 1975. The studies have produced basic information on geologic hazards of the area, including location of probable active faults, potentially unstable sediments, and erosional and deposition areas on the shelf. The work is being continued through fiscal year 1980 to gather additional tract specific hazards information. Refer to sections III.A.1. and IV.A.1.g. for more detailed discussion about geologic hazards.

c. Pollutant Transport: Transport and transformation (weathering) of petroleum-related contaminants are significant considerations in an assessment of potential impacts of OCS developments. Petroleum and other contaminants introduced into the environment can be transported in the atmosphere, in the water column, and by sea ice. During transport, contaminants undergo continual physiochemical changes, such as evaporation, flocculation, emulsification, weathering, biodegradation, and decomposition.

Transport studies are designed to provide information that will enable the Department of the Interior and other agencies to 1) plan stages and siting of offshore petroleum development to minimize potential risks to sensitive environments, 2) provide oilspill trajectories, coastal landfall, and effects of oilspill cleanup operations, and 3) assist in planning the location of long-term environmental monitoring sites in the study area.

Prior to the Alaska Outer Continental Shelf Program, no systematic physical oceanographic studies were conducted on all the Gulf of Alaska Continental Shelf. No long-term direct measurements of coastal winds and currents had been performed. Transport studies were designed to proceed from a regional description of oceanographic and meteorological features to analyses of processes. Oceanographic investigations included literature summaries, current measurements, hydrographic station data, remote data sensing, and computer modeling. Meteorologic studies have concentrated on field observations and computer simulation of coastal wind patterns.

Study efforts in fiscal year 1980 were devoted to analysis and synthesis of data, and continued modeling activities involving weathering, transformation, and spreading. The expected product will be a single report summarizing what is known about transport systems of the Cook Inlet and Shelikof Strait.

d. Biological Resources: A major reason for conducting biological population studies in the Cook Inlet/Shelikof Strait has been to determine which populations, communities, and ecosystems are at risk from either acute or chronic oilspills. The studies are intended to give insight into the cumulative risks to biological resources around Kodiak Island and in lower Cook Inlet. Distribution and abundance estimates, migration patterns, feeding sites, and population behavior are the first studies undertaken. The study results are used to determine potential vulnerability. Should vulnerability be indicated, detailed site-specific studies are undertaken. These studies focus on ecosystem processes, trophic and population dynamics, disturbance sensitiviy, habitat dependence, and physiological characteristics.

The first few years of biological studies have been concerned with the distribution and abundance of key species through reconnaissance surveys. For higher trophic levels, these studies identify critical habitats, migratory routes, and principal seabird and marine mammal breeding locations.

A few remaining reconnaissance studies will be completed in fiscal year 1980. These studies pertain to data gaps with respect to commercial fisheries, marine birds, and marine mammals, including endangered whales.

e. Effects: Effects research is ongoing, not tied to any one lease area. The research results are used to establish possible causal relationships between OCS-related perturbations and biological changes, and to form the basis for developing discharge regulations and operating stipulations. Also, the studies program is evaluating biological responses to stresses, in order to determine their potential usefulness as early warning indicators or monitoring aids in detecting and/or quantifying environmental changes.

Prior to 1979, most effects studies were conducted in the laboratory. However, in fiscal years 1979 and 1980, the emphasis shifted toward field studies. The field studies are designed to validate laboratory observations and to obtain data on exposure concentrations and compositions likely to occur under various environmental conditions.

A bibliography of environmental studies completed in fiscal year 1979 can be found in appendix I.

3. Socioeconomic Studies Program: The socioeconomic studies program (SESP) of the Alaska OCS Office was created to determine and assess the potential onshore social, economic, and physical impacts from outer continental shelf oil and gas development. As a multiyear, multidiscipline program, the SESP conducts studies on the sociological and anthropological aspects of diverse groups. The SESP focuses on a longitudinal investigation of the development process, beginning from the assembly of predevelopment information to the monitoring of project development as it affects specific communities, regions, or the State as a whole. In addition, the program makes economic analyses of rural and urban communities, regions within the State, and the State as a whole, with assessments of both natural and man-made infrastructures.

The overall methodology is divided into three broad research components. The first component identifies an alternative set of assumptions regarding the location, nature, and timing of future petroleum events and related activities. In this component, the program takes into account the particular needs of the petroleum industry and projects the human, material, economic and environmental offshore and onshore development requirements of the regional petroleum industry.

The second component focuses on data gathering that identifies those quantifiable and qualifiable facts by which OCS-induced changes can be assessed. The critical community and regional components are identified and evaluated. Current sources of change and functional organization among different sectors of community and regional life are analyzed. Susceptible community relationships, values, activites, and processes are also included.

The statewide/regional analysis focuses on the statewide effects of cumulative and incremental lease sales and the distribution of these effects among certain defined subregions of the State. The local level analysis focuses on the direct effects of the lease sale on affected communities.

The SESP identified the study area for the lower Cook Inlet/Shelikof Strait petroleum development region to include the census divisions of Matanuska-Susitna, Anchorage, Kenai-Cook Inlet, Kodiak, and Seward. The following major study tasks were conducted.

a. Petroleum Development Scenario: Numerous oil and gas options were constructed through a combination of U.S. Geological Survey resource estimates and locational data from independent geologic assessment. A parameter economic analysis was conducted to assess their economic viability. These scenarios were then detailed according to technology; facility, material, and manpower requirements; and scheduling. Four different levels of petroleum development were prepared.

b. Statewide and Regional Population and Economic Forecasts: A non-OCS base case was developed that assumed no new significant oil, gas, or other mineral development in Alaska beyond current commitments. Forecasts were then prepared for four different potential levels of oil and gas development. Forecasts to the year 2000 were made for population, employment, income, and State government fiscal impacts.

c. Impacts on Socioeconomic and Physical Systems: Community facility standards were developed and applied to the non-OCS base case and each of the four oil and gas scenarios. The data included education, public safety, recreation and tourism, utilities, housing, and local government resources, investments, and capital needs.

d. Impacts on Transportation Systems: A methodology was developed and applied to assess impacts of the land-, air-, and water-related transportation modes. The ability of these modes to move goods and materials in and out of the region and throughout the State for the non-OCS base case and for the four scenarios was assessed.

e. Impacts on the Sociocultural System: Issues analyzed were traditional use of all resourecs including land, marine, and ice environments; subsistence; cultural values; politics; interethnic relationships; social health; and familty relationships.

From September 1976 until early 1980, Peat, Marwick, Mitchell and Co. had the responsibility to hire subcontractors to perform the work required for impact assessment. The following is a list of contractors who have conducted research tasks for the lower Cook Inlet/Shelikof Strait petroleum development region and impacted area: Peat, Marwick, Mitchell and Co.; Jim Lindsay and Associates;

Dames and Moore; Peter Eakland and Associates; University of Alaska Sea Grant Program; Alaska Consultants, Inc.; Policy Analysts, Ltd.; Institute of Social and Economic Research; U.S. Coast Guard; the Pacific Northwest Forest and Range Experiment Station of the U.S. Department of Agriculture, Forest Service; Stephen R. Braund and Associates; University of Alaska Museum; James T. Payne and Associates; and Cultural Dynamics, Ltd.

H. Future Environment Without the Proposal

1. Social Factors: This discussion summarizes section III.H.1. of the DEIS for proposed sale 60 (appendix W of this FEIS). Anticipated growth through the year 2000 in Kenai, Soldotna, Homer, Kodiak, and Port Lions without the proposed lease sale is covered. Sources of information for this discussion include: Alaska Consultants, Inc., 1980, Technical Report Number 46, Volume 2; Alaska Consultants, Inc., 1979, Technical Report Number 40; Kodiak Native Association, 1980, Overall Economic Development Program 1980; Kodiak Area Native Association, 1979, Five Year Regional Health Plan 1981-1985.

Kodiak: The base case forecast is for steady population growth in the Kodiak urban area at an average rate of over 5 percent annually and a cumulative increase of over 120 percent over the forecast period. The key economic activities in Kodiak's future will remain the fishing and seafood processing industries. Due to the existing pattern of harbor and processing plant facilities, the city of Kodiak is forecast to strengthen its preeminent role as the center of the island's fishing industry. Thus, about two-thirds of the Kodiak area's population growth and most of the employment growth is expected to take place within the city. Kodiak is forecast to grow from an estimated 4,818 in 1980 to 10,229 in 2000.

Port Lions: Port Lions is estimated to grow at an annual rate of 3 percent under the base case forecast. This growth rate is slightly higher than other Kodiak Island villages and stems primarily from the community's expressed desire to attract new industry and the expanded housing availability which will encourage a larger proportion of the younger populace to remain in the community rather than emigrate as has been the case in the past. The population of Port Lions is forecast to grow from an estimated 266 in 1980 to 481 in 2000. Even this moderate 3 percent annual growth rate is substantial for a community the size of Port Lions.

Kenai: The pace of population growth, estimated to average just over 2 percent annually, is even slower than during the post-1970 period and is quite different from the explosive growth pattern of the 1960-70 decade. In sum, the base case projection envisions a diminished rate of economic and population growth for the City of Kenai. The population is forecast to rise from an estimated 4,755 in 1980 to 7,000 in 2000.

Soldotna: Soldotna is estimated to grow at an annual average rate of about 4 percent under the base case forecast. This growth rate is slower than in the previous decade and much slower than the decade before that. As Soldotna's population is estimated to increase by about 81 percent over the forecast period, the city should experience a trend toward a more urbanized community. The population of Soldotna is forecast to grow from an estimated 2,572 in 1980 to 4,667 in 2000.

Homer: The economic base analysis indicates that the city of Homer's growth will be stimulated by a continuing dynamic economy during the forecast period. The net result of these factors is that Homer is projected to average growth at about 7.5 percent annually, for a cumulative increase of 153 percent over the forecast period. Homer's population is forecast to increase from an estimated 2,148 in 1980 to 5,429 in 2000. For a community of Homer's size, this is a high rate of sustained growth.

2. Economy: This discussion summarizes section III.H.2. of the DEIS for proposed sale 60 (appendix W of this FEIS).

Historically, fishing and fish processing have been the foundation of the Kodiak economy. In recent years, the fisheries industry has broadened to include other species of fish and shellfish. From 1969-1978, the average annual contribution of the Shelikof Strait fisheries to Kodiak, expressed in 1978 ex-vessel dollars, was about $13,541,100. The figure includes all the species listed in the next sentence except groundfish and herring roe. Commercial industry now includes halibut, herring, herring roe, king crab, tanner crab, dungeness crab, shrimp, and some species of groundfish. Thus, the fishing industry in Kodiak has evolved from a seasonal salmon fishery to a more diversified year-round industry with a relatively large degree of diversity among the fleets and processing facilities. The no-sale case assumes that this trend towards diversification will continue.

The wood products industry is expected to expand. Under terms of the Alaska Native Claims Settlement Act, substantial quantities of timber will be transferred to the private sector, and presumably, harvested. The tourism and recreation industry is also expected to show modest growth. Promotion of Kodiak historical and recreational assets should attract an increased number of tourists, conventioneers, and vacationers. The status of the Kodiak Coast Guard station is expected to remain relatively unchanged, although passage of the 200-mile fishery conservation zone act may be seen as a sign that the activities of the Coast Guard station will increase.

Kodiak Villages: Without the sale, the future of the six Kodiak villages is likely to bring little, and at most, moderate change in the foreseeable future. Employment is principally in the commercial fishing industry, which offers a high degree of flexibility and freedom to pursue subsistence lifestyles.

Kenai-Cook Inlet Census Division: The future of the Kenai/Cook Inlet census division without the proposal is not a non-OCS forecast. It includes a level of OCS activity corresponding to the medium case scenarios from the CI sale. A strong level of oil and gas related industrial facilities already exists in the Kenai/Cook Inlet census division. Therefore, it is reasonable to assume that the significance of any impact from proposed sale 60 would be relatively minimal since industrial facilities with excess capacity would probably be utilized. Excess capacity will result from the decline of production in oil and gas activities from the now developed upper Cook Inlet as well as activities from sale CI.

IV. ENVIRONMENTAL CONSEQUENCES

A. Environmental Impacts of the Alternatives Including the Proposal

1. Basic Assumptions Used Regarding Causes of Possible Impacts Resulting from the Alternatives Including the Proposal: Under the terms of the proposed action a total of 349917 hectares (864,646 acres) would be leased for oil and gas exploration and development. For the other alternatives the considered lease areas are as follows: alternative IV, 154484 hectares (381,443 acres), alternative V, 126816 hectares (313,125 acres), and alternative VI, 154080 hectares (380,630 acres). Undiscovered recoverable resources resulting from the mean case of the proposed action are estimated by USGS to be 670 MMbbls of oil and 1.17 Tcf of natural gas.

Within the following sections, every effort has been made to quantify impacts which could result from this proposed sale. The mean case has been utilized to quantify probable development activity levels. Mean case variables have been used in measuring impacts. There are, however, areas in which quantification of impacts is difficult due to lack of data and the variability of factors affecting any potential development. (Information regarding the minimum and maximum cases can be found in appendices A and B.)

Impacts described within this document are written with the view that all pertinent laws of the United States, including USGS Gulf of Alaska Operating Orders (see appendix C), would be in effect and would act to shape and/or mitigate impacts. Further, the discussion of cumulative effects contained in each impact section is based on the interrelationship of the proposed action and other major current and proposed projects. Section IV.A.1.h. contains a list and a discussion of projects considered in preparation of the cumulative effects sections.

a. Activities Associated with Exploration: It is assumed that 16 exploration and delineation wells may be drilled in Cook Inlet and Shelikof Strait as a result of this proposed sale. Moderate exploratory drilling activity would take place during the primary terms of the leases, with a maximum of three exploratory rigs working at any one time.

Vessels for drilling exploratory wells would probably arrive from a variety of regions (most probably offshore eastern Canada, the Gulf of Mexico, and the North Sea). Two types of rigs, jack-ups and semisubmersibles, would probably be used. Once a drilling rig is in place and drilling commences, special muds are circulated through the well bore to provide pressure control, lubrication of the drill bit, and the removal of drill cuttings from the hole. (Amounts are shown in table IV.A.1.a.-1.)

Drill cuttings are composed of rock fragments and liquids contained in the geological formation through which the drilling bit travels. To remove the drill cuttings, drilling muds (fluid) from the mud tanks are circulated down the hole (well) through the drill pipe. Drilling muds are passed out the drilling bit nozzle picking up drill cuttings, and returned to the surface between the drill pipe and walls of the bore hole and/or casing. At the surface, drill cuttings are physically separated from the muds by screening and washing techniques. After the drill cuttings and drilling muds are separ-

Table IV.A.1.a.-1
Estimated Volume of Drilling Muds and Drill Cuttings
Exploratory Period

	Minimum Case	Mean Case (Alt.I)	Maximum Case	Alternative IV	Alternative V	Alternative VI
1/Drill Muds	10395 mt (11550 st)	15120 mt (16800 st)	2740 mt (30450 st)	9450 mt (10500 st)	4725 mt (5250 st)	10395 mt (11550 st)
2/Drill Cut-tings	2846 m^3 (4125 y^3)	4140 m^3 (6000 y^3)	7304 m^3 (10875 y^3)	2587 m^3 (3750 y^3)	1294 m^3 (1875 y^3)	2846 m^3 (4125 y^3)

1/ Assumes 945 metric tons (1050 short tons) per well.

2/ Assumes 259 m^3 (375 y^3) per well.

mt = Metric Ton
st = Short Ton

Source: Geological Survey, 1980. BLM/Alaska OCS Office, 1980.

NOTE: For a discussion of muds and cuttings produced during the production phase of the proposal and each of the alternatives, please see tables II.B.1.a.-1, II.B.4.a.-1., II.B.5.a.-1, and II.B.6.a.-1.

ated, the drill cuttings are discharged to the ocean and the muds are returned to the mud tank for recirculation down the hole. Drilling muds that are not separated from the drill cuttings are discharged to the ocean.

Removal of drill cuttings from the hole is only one function of drilling muds. To obtain satisfactory results in the completion of any well, drilling muds serve a variety of functions. To receive maximum benefit from drilling muds at each hole, the mud engineers must change the drilling mud component as new physical information is found at deeper well hole depths. Discharges of drilling muds must comply with regulations found under OCS Order No. 7 (appendix C of the DEIS), and 40 CFR (Part 435, Section 435.22). Both of these regulations restrict the discharge of any drilling muds containing oil. Additionally, OCS Order No. 7 forbids the discharge of drilling muds containing toxic substances into the ocean waters. The Geological Survey, Conservation Division, states if any oil-based muds are used, the muds would not be released into the ocean, and cuttings would be cleaned or barged to shore for disposal. Currently, the only mud components used to make up drilling muds that must be registered with the Environmental Protection Agency are bacteriocides.

In drilling, the volumes of drilling muds and drill cuttings are dependent on the well and the hole size; both dictated by the well casing program. The estimation of the volumes of both drilling muds and drill cuttings for the exploration and delineation wells are based on USGS estimates developed for an average well depth of 4878 meters (16,000 ft). These volumes are summarized on table IV.A.1.a.-1. for the proposal (alternative I) as well as for alternatives IV, V, and VI.

The amount of drilling muds discharged during the normal operation of a well depends mainly upon the type of formation drilled. The more active clays contained in some formations are the more difficult to remove from muds, thus requiring more mud disposal. The formation and conditions also dictate the mud densities required. This determines the cost and type of equipment needed in separation of mud compounds. Other considerations include the cost of the additives and disposal. Generally, the more difficult it is to separate solids from the mud compound, the greater the need for discharge. Conversely, the more costly the additives or disposal, the lesser the discharge. The USGS estimates that the overboard loss of mud (discharge) would be small; downhole mud loss would be 10 percent of the used mud. Mud system discharge on production wells would be recycled and reused.

Approval of mud disposal may or may not be site-specific, but may be applied to the entire drilling program. A small amount of drilling muds is normally discharged 1) with the drill cuttings, 2) when cleaning shale or sand tanks, 3) while drilling the upper portion of the hole before establishing circulation to the drilling platform, and 4) upon disconnection of a marine riser. The last two cases apply only to operations from floating drill platforms and not to jack-ups or fixed-production platforms.

Chromium, present in some marine drilling muds, is of concern because of its possible toxic effects on marine organisms. Overboard loss or discharge of drilling fluids would introduce some of this chromium into the marine environment. Chromium occurs in the form of an organic complex ferrochrome lignosulfonate, which may be used in mud programs on the Alaska OCS. Most oil-based muds are used for well completions and other special operations, such as coring.

The use of chrome materials, oil, and other toxic materials in some Pacific offshore mud systems has been avoided for several years. Sodium lignosulfonate has replaced ferrochrome lignosulfonate in some Pacific offshore mud systems.

Barium sulfate is essentially non-toxic to marine organisms. It is used as a weighting agent to control formation pressures while drilling in the middle to bottom portions of the hole. Chromium lignosulfonates are thinners and are placed into a mud system for control of viscosity, gel strength, and filtrate loss. There is concern about products containing chromium because of the possibility that they may be toxic and could be released into the environment.

Occasionally, abnormal formation pressures, exceptionally tight formations, or other problems require the use of oil-based mud or highly treated drilling muds. Drill cuttings are then separated and cleaned of entrained oil before being discharged overboard. The drilling muds are retained and shipped to shore and stored in tanks for future use.

Solvents which are used primarily to clean equipment on mobile rigs and platforms pose no significant threat to the OCS environment. Solvent that is spilled on the platform is collected by curbs, gutters, drains, or drip pans. The drainage is then treated in a gravity separator or transferred to the production treatment system. Discharge must meet EPA oil and grease limitations. Sewage treatment and disposal on offshore rigs and platforms is very similar to a holding and settling tank, except for the addition of a chlorination system. In this case, the system is normally a fiberglass container somewhere on the platform into which all toilet, kitchen, and laundry drains discharge. The usual settling and bacterial digestion takes place in the tank and the final effluent is chlorinated.

EPA regulations and OCS Orders require that the effluent have a minimum chloride residual of 1.0 mg/l after a minimum retention time of 15 minutes. As in every other instance in which chlorination is used as a method of disinfection, the potential exists that trace quantities of chlorinated compounds may be discharged that may be harmful to organisms. However, the effects of such trace quantities are only now beginning to be investigated.

Since all sites occupied by drilling rigs must be avoided by fishing boats, this could result in the removal of some fishing grounds during the exploratory phase could result. Jack-ups remove some 1 to 2 hectares (2-5 acres) per structure, while semisubmersibles using 458 meters (1500 ft) anchoring radii would remove up to 65 hectares (162 acres) each. Permit applications for drilling normally request a 1-mile avoidance area. If such an avoidance buffer is included around each drilling rig, then 804 hectares (2,011 acres) per rig would be temporarily withdrawn from use. During the exploratory phase, 2412 hectares (6,033 acres) could be removed from fishing at any one time as a result of the proposed action. In the cases of alternatives IV, V, and VI, 1608 hectares (4,022 acres) would be removed from fishing activities. For the maximum scenario, about 3216 hectares (8,044 acres) would be removed during the year of peak exploratory activity (1984).

It has been assumed that Kenai, primarily, and Homer, secondarily, would function as marine support bases for proposed sale 60 exploratory activities. In the mean case, six service vessels would operate from these support facilities. Up to ten service vessels would be required in the maximum case.

Air support activities would come most probably from fields located near the proposed sale 60 marine support bases. The exploratory phase of the mean case would require up to four helicopters, while that of the maximum case would require up to six helicopters.

Peak employment during the 5-year exploratory phase is estimated to occur in 1985 when 519 persons would be employed. For a detailed description of the basic assumptions used to estimate employment, and summary tables of direct employment, refer to appendix B of the DEIS.

b. Activities Associated with Development: If oil and gas are discovered as a result of this proposed sale, fixed platforms may be installed offshore. Technology presently exists to install platforms in all water depths within the proposed sale area.

It is assumed that all production platforms would be constructed outside of Alaska; either at existing U.S. west coast or Japanese shipyards. The platforms would then be transported to location via barges.

Once platforms were installed, one or two drilling rigs would be placed on each platform to drill production wells. For purposes of this analysis, it is estimated that as a result of this proposal there may be 195 development and service wells drilled from 4 platforms. The maximum case would involve the drilling of 295 production and service wells from 6 platforms. Since all sites occupied by production platforms must be avoided by fishing boats, this could result in the removal of some fishing grounds. Each platform occupies a site of 1 to 2 hectares (2-5 acres). Assuming a 1-mile buffer zone around each, 3216 hectares (8,044 acres) might become off limits for fishing because of platforms installed as a result of the proposal. The sites would be usable again once platforms were removed after the termination of production.

During the development stage, drilling muds are recycled from one well to another (the downhole loss being about 10%). The amount of mud used for each initial 10,000-foot platform production well is estimated to be some 750 tons. The volume of drill cuttings for the field is assumed to be 40170 cubic meters (52,455 yd^3) for the proposal, and 60770 cubic meters (79,355 yd^3) for the maximum case.

The development period of proposed sale 60 is expected to occur between 1986 and 1991. (Please note that there is no clear time distinction between the exploratory, development, and production periods. In reality the wind-down phase of one activity or period would extend into the time frame of another.) It is during this period that drilling and construction activities would reach their greatest intensity. In this 5-year timeframe, the bulk of developmental drilling would occur, all trunk pipelines would be emplaced, and the oil terminals and gas compressor station, as well as all necessary industrial infrastructures, would be constructed.

Existing support and supply facilities at Kenai would likely be sufficient to handle any proposed sale 60 activity emanating from that port. However, by 1986, a second 10-hectare (25 acres) marine support base could be constructed at Homer. In the same year two oil terminals and a gas compressor station would be built. The oil terminals would require 120 acres apiece and the gas compressor station about 40 acres. The compressor station and one oil terminal

Table IV.A.1.b.-1
Summary of Pipeline Lengths and Sea Bottom Disturbances[1/]

	Minimum Case	Mean Case (Alt.I)	Maximum Case	Alt. IV	Alt. V	Alt. VI
Oil Pipeline Diameter	18"	24"	26"	18"	18"	18"
Gas Pipeline Diameter	10"	18"	26"	10"	10"	-0-
Onshore (lengths)						
Oil Pipeline	-0-	14 km	14 km	-0-	-0-	-0-
Gas Pipeline	97 km	97 km	97 km	97 km	97 km	-0-
Offshore						
Oil Pipeline	110 km	221 km	221 km	124 km	110 km	110 km
Gas Pipeline	110 km	221 km	221 km	124 km	110 km	-0-
Total Sea Bottom Disturbance	441600 m^3	1104000 m^3	1324800 m^3	496800 m^3	441600 m^3	441600 m

[1/] It is assumed that the oil and gas pipeline will be laid in separate cut parallel trenches.

Source: USGS, 1980; and BLM Alaska OCS, 1980.

could be located at a point somewhere between Anchor Point and Stariski Creek. The other terminal could be located north of Port Lions in the Talnik Point/ Inner Point area. Both terminals would have the capacity to store up to 5-days production. Additionally, the airfield at Port Lions could undergo construction activities aimed at improving its effectiveness in supporting developmental efforts.

By 1987 a total of 380 miles of 18-inch gas and 24-inch oil trunk pipeline may be operating (please review table IV.A.1.b.-1 for a breakdown of onshore and offshore pipeline lengths). The oil pipeline is hypothesized to consist of two systems, one of which would drain the oil production of Cook Inlet into the Anchor point facility. The other pipeline would drain the oil production of the Shelikof Strait into the facility near Talnik Point. All gas could be piped to the compressor station near Anchor Point and, hence, overland 113 kilometers (70 mi) to the existing LNG plant(s) at Nikiski. The hypothesized pipeline route from near Anchor Point to Nikiski would traverse a flat, wooded coastal plain dissected by occasional creeks and rivers. By 1991, with the drilling of the last of the production and service wells, the developmental stage would end.

In comparing the development phase of the proposal with those of the other alternatives, it is apparent that the scenarios for the other alternatives are, for the most part, variations on the scenario described for the proposal. Alternatives IV and V are essentially the Cook Inlet portions of the proposal's scenario. Alternative VI is essentially the southern half of the proposal, but differs from it in that any gas produced would be reinjected into the formation. The maximum case scenario (see appendix A) is the same as that described for the proposed action.

Peak employment for the development phase is hypothesized to occur in 1986 with a total annual employment of 1,607. This would include 430 persons involved in offshore drilling, 325 persons for service vessels and helicopter support, and 852 workers for construction of the onshore facilities. For a detailed description of the basic assumptions used to estimate employment, and summary tables of direct employment, refer to appendix B. For supply vessel and aircraft requirements, refer to appendix A.

c. Activities Associated with Production: During peak production, offshore employment supporting oil and gas operations would be less than during the development phase. Transportation requirements, and consequently onshore operating base employment, would also be reduced. At peak production, two helicopters and two supply vessels would be needed. Hypothetically, annual employment during the peak production year (1991) would be 987 persons; 617 people would be involved in offshore drilling and onshore production activities, and 370 persons would be employed in the various transportation support systems.

For purposes of this analysis, it is assumed that 195 production and service wells would be drilled (mean case). Daily production of 265 Mbbls of oil and 464 mmcf of natural gas could result from the amounts of recoverable resources estimated by the USGS. As previously indicated, production is expected to be conducted from four platforms. These production platforms would contain all the equipment and perform the same functions as an onshore field gathering station.

Using the upper Cook Inlet oilfield as a yardstick, it can be hypothesized that at mid-life (12 yrs), the proposed sale 60 field might produce one barrel of formation water for every two barrels of oil.

The transportation of natural gas, produced as a result of proposed sale 60, from near Anchor Point to Nikiski may necessitate the expansion of the then-existing LNG facilities. Pacific Alaska LNG Associates is scheduled to begin construction of their 400 MMcf/day LNG plant in spring of 1982. The new Pacific plant coupled with the existing Phillips plant would bring the processing capacity of Nikiski to 585 MMcf/day of natural gas. Pacific-Alaska LNG officials have discussed informally the possibility of adding an additional 200 MMcf/day capacity to their future Nikiski plant; however, such an eventuality (or even the planning for such an event) would depend entirely on the success of resource explorations in Cook Inlet and on the Kenai Peninsula.

All LNG produced as a result of proposed sale 60 would be transported to the west coast of the United States. The point of reception would likely be the proposed LNG degasification plant at Point Conception, California. However, should a major gas strike be realized within the proposed sale 60 area, the Point Conception plant may not be able to handle the full amount of production. This possible west coast "glut" of natural gas may necessitate transportation schemes different from those outlined within this EIS.

A 25-year life for the production of oil and 26-year life for natural gas has been forecast for the proposal. Upon cessation of production, OCS orders require wells to be plugged, the casing severed well below the mudline, the platform removed, and all obstructions cleared from the area. Major trunklines may be used for future production from adjacent areas, but smaller lines would probably be abandoned in place. Abandonment consists of purging the lines of entrained hydrocarbons by water flushing (the water is disposed of onshore after reclaiming the hydrocarbons) and severing the ends below the mudline. Water from the flushing operation would be disposed of according to State and Federal regulations. The necessity for removal of pipelines nearshore is usually regulated by the State.

d. Oilspill Risk Analysis: Oilspills are one of the major concerns associated with offshore oil production. There is uncertainty about whether oil will be discovered, or the amount of oil which may be produced. In addition, uncertainty exists as to the number and size of oilspills which might occur, and the wind and current conditions which would transport the proposed oil.

The oilspill risk analysis was conducted in three parts. The first part dealt with the probability of oilspill occurrence, and the second with the trajectories of oilspills from potential launch points to various targets. Results of these two parts of the analysis were then combined to give estimates of the overall or final oilspill risk associated with oil and gas production in the lease area.

Estimating Quantity of Oil Resources: The estimated oil resources used for oilspill risk calculations in this report are "unrisked mean estimates"--the amount of oil expected to result from the proposed sale assuming that oil is discovered in economically recoverable quantities.

Where the likelihood of not finding oil is high--as is the case for proposed lease sale 60--the risked mean estimate will be much lower than the unrisked mean estimate. The unrisked mean estimate used in this analysis therefore represents a greater number of potential oilspills than the risked mean estimate. For the entire proposed lease area, the unrisked mean estimate over the 26-year life of the field is 670 MMbbls. For alternative IV, the unrisked mean estimate was calculated to be 260 MMbbls; for alternative V, 180 MMbbls; and alternative VI, 346 MMbbls. The estimates for the alternatives could differ by about 10 percent, depending upon assumptions made in estimating the amount of oil in each subarea. The unrisked mean estimate of resources from existing leases in lower Cook Inlet is 826 MMbbls (sec. II.B.1.a.). Again, it is very unlikely that all of these oil resources would be discovered. However, over the 26-year life of the proposed sale 60 field, an estimated 1,050 MMbbls of oil from other sources will be transported by tankers through the study area.

Probability of Oilspills Occurring: Statistical distributions for estimating probabilities of oilspill occurrence were taken from Devanney and Stewart (1974), Stewart (1975), and from USGS files of offshore platform accidents. Greater risks are associated with greater volumes of oil. In this analysis, it was assumed that 1) future spill frequencies can be predicted from past OCS experience, 2) spills occur independently of each other, and 3) the spill rate is dependent on volume of oil produced and handled. The first assumption might be modified by a decrease in future spill rates due to experience and improved standards, or by an increase because of unknown conditions in new territory. The assumption that spills occur independently of each other could be modified by assuming a positive correlation (if a spill occurs, conditions are such that more will follow shortly) or by assuming a negative correlation (if a spill occurs, extra precautions are taken). This analysis takes the middle ground between these two assumptions by using historic spill rates. The final assumption--that the spill rate is a function of the volume of oil handled--might be modified on the basis of size, extent, frequency, or duration of the handling. In the case of tanker transport, for example, the number of port calls and the number of tanker-years have been contemplated (Stewart, 1976 and Stewart and Kennedy, 1978). This analysis uses volume of oil handled, since all other estimates must ultimately be derived from this quantity.

Spill frequency estimates for oilspills greater than 1,000 barrels in size were calculated for production and transportation of oil from proposed sale 60, from sale CI, and for existing transportation of oil by tankers from upper Cook Inlet. For proposed lease sale 60, an average of four spills greater than 1,000 barrels are projected over the 26-year life of the field. There is a 98 percent chance that at least one spill of this magnitude will occur. Table 1 in appendix D shows the expected number of spills and the most likely number of spills that could occur during the production life of the proposed lease area.

Oilspill Trajectory Simulations: To model oilspill movement in the complex wind and current regime of the study area, two trajectory models were mathematically linked. The first was a model developed for the Cook Inlet and Shelikof Strait areas by Dames and Moore, Inc., under the BLM Environmental Studies Program. This model incorporates tidal currents and the effects of nearby mountains on winds, two effects which significantly influence oilspill movement in both Cook Inlet and Shelikof Strait. For any spill originating within either area, the wind record was sampled by randomly selecting a starting time and date, and the tidal currents were calculated to match the wind record. The movement of each trajectory was simulated in 30-minute increments, updating the winds and currents for each movement. The spill trajectory information was transmitted to the U.S. Geological Survey, Reston, Virginia, via computer tapes.

The second trajectory model was the U.S. Geological Survey Oilspill Trajectory Analysis (OSTA) model, which was used to simulate the movement of any oilspills moving outside the boundaries of the Dames and Moore, Inc. model. This was essentially the same model used by Samuels and others (1980) for an earlier oilspill risk analysis of the cancelled western Gulf of Alaska lease sale 46.

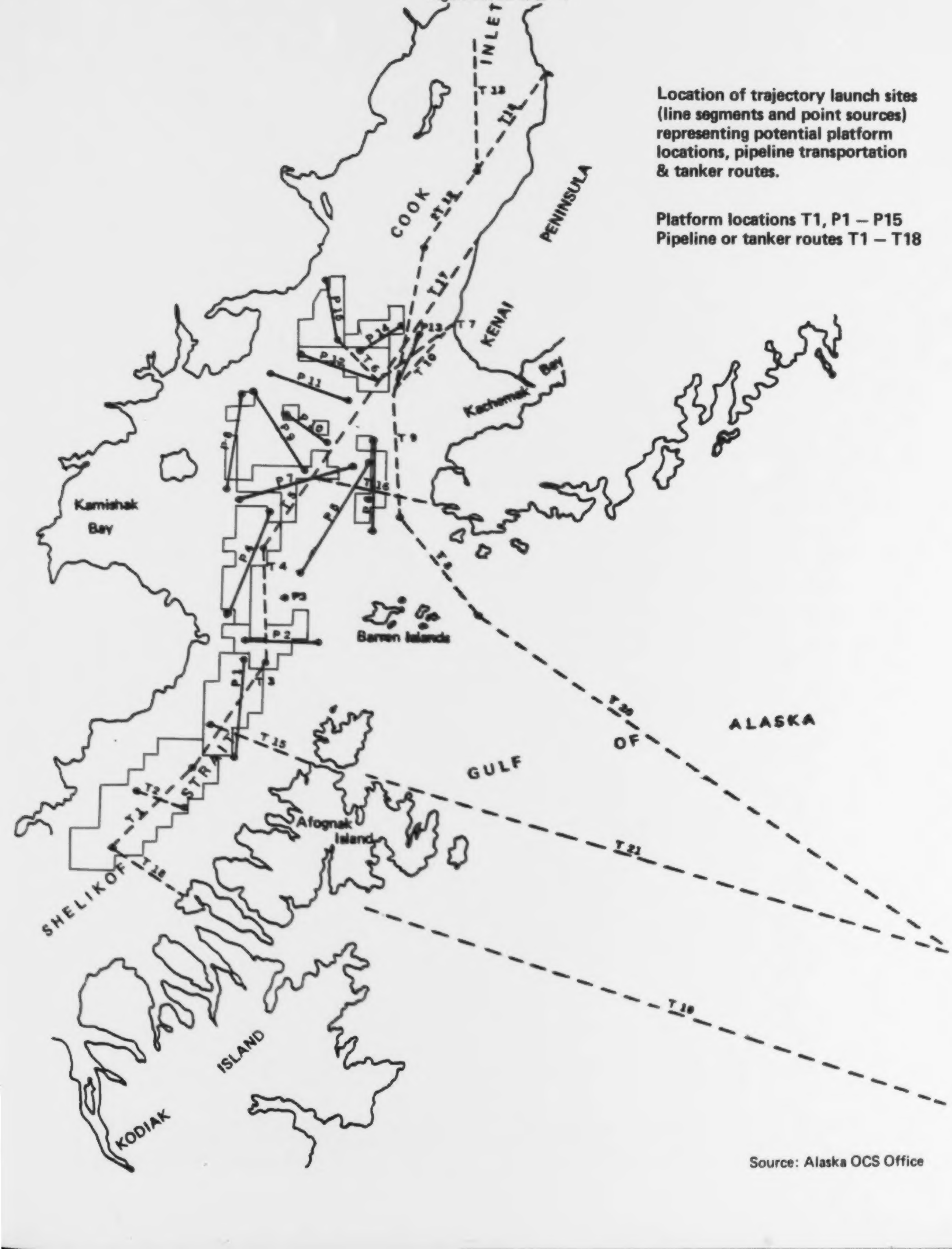
It should be emphasized that the trajectories simulated by the models represent only hypothetical pathways of oil slicks and do not involve any direct consideration of cleanup, dispersion, or weathering processes which would determine the quantity or quality of oil that could eventually come in contact with targets. Results of spill trajectories are presented for 3 days, 10 days, and 30 days. Three days represent relatively high toxicity potential with minimal weathering and dispersion. Within 10 days, most of the trajectories have made contact with land and resource targets within the proposed lease area. Within 30 days, considerable weathering would be expected and most spills are difficult to track or locate after this time if they have not come in contact with land.

A total of 38 hypothetical point source and line spill locations were selected as likely spill locations from potential transportation routes and drilling sites within the study area (fig. IV.A.1.d.-1). In order to obtain a statistically significant sample, 200 trajectories were initiated at each launch site for both summer and winter seasons for a total of 15,200 trajectories. The summer season was defined as the period from April through September.

The major overall seasonal effect in the trajectories was a northward shift of the paths and impact locations during the summer season due to the decreased net transport and increased frequency of winds from the south during the summer. Sample trajectories launched from line segment P7 and point source P3 showed a net movement into Shelikof Strait during the winter period (figs. IV.A.1.d.-2 and IV.A.1.d.-3). Some of the trajectories from the more northern source, P7, moved into Kamishak Bay and also through Stevenson Entrance to the west in the winter (fig. IV.A.1.d.-2). Trajectories launched further south at P3 behaved similarly, but did not enter Kamishak Bay during the winter. During summer, at both sample launch points, the trajectories from P7 were more variable, but predominantly dispersed northward where the patterns suggest an expected greater influence from tidal flux (figs. IV.A.1.d.-4 and IV.A.1.d.-5).

The sample trajectories from P3 during the summer season were also highly variable and remained somewhat confined within the area of P3. Those trajectories which entered the Shelikof Strait made contact with land segments along the east bank (fig. IV.A.1.d.-5). For additional information concerning the seasonal effects of oilspills on biological resources, see sections IV.A.2.a. through g.

Figure IV. A. 1. d. –1

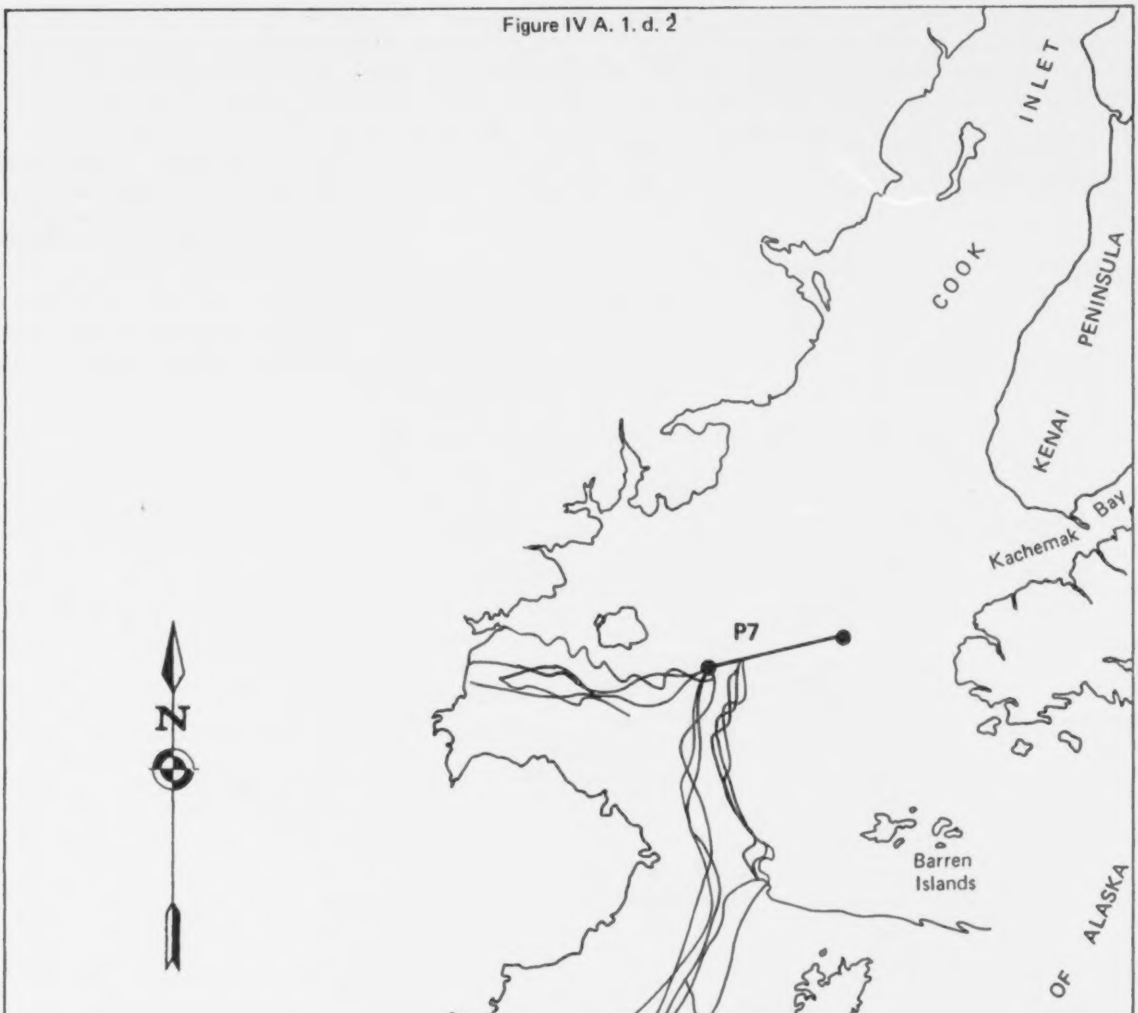

INLET
T 13
T 12
COOK
PT 11
T 11
T 17
PENINSULA
KENAI
P 16
P 14
P 13
T 7
T 10
P 15
T 6
P 11
P 10
P 9
P 8
T 9
Kachemak Bay
Kamishak Bay
P 7
T 16
T 5
P 6
P 5
T 8
P 4
T 4
P3
P 2
Barren Islands
P 1
T 3
T 20
ALASKA
OF
GULF
T 15
STRAIT
T 2
T 1
Afognak Island
T 21
SHELIKOF
T 18
T 19
ISLAND
KODIAK

Location of trajectory launch sites (line segments and point sources) representing potential platform locations, pipeline transportation & tanker routes.

Platform locations T1, P1 – P15
Pipeline or tanker routes T1 – T18

Source: Alaska OCS Office

Figure IV A. 1. d. 2


COOK INLET
KENAI PENINSULA
Kachemak Bay
P7
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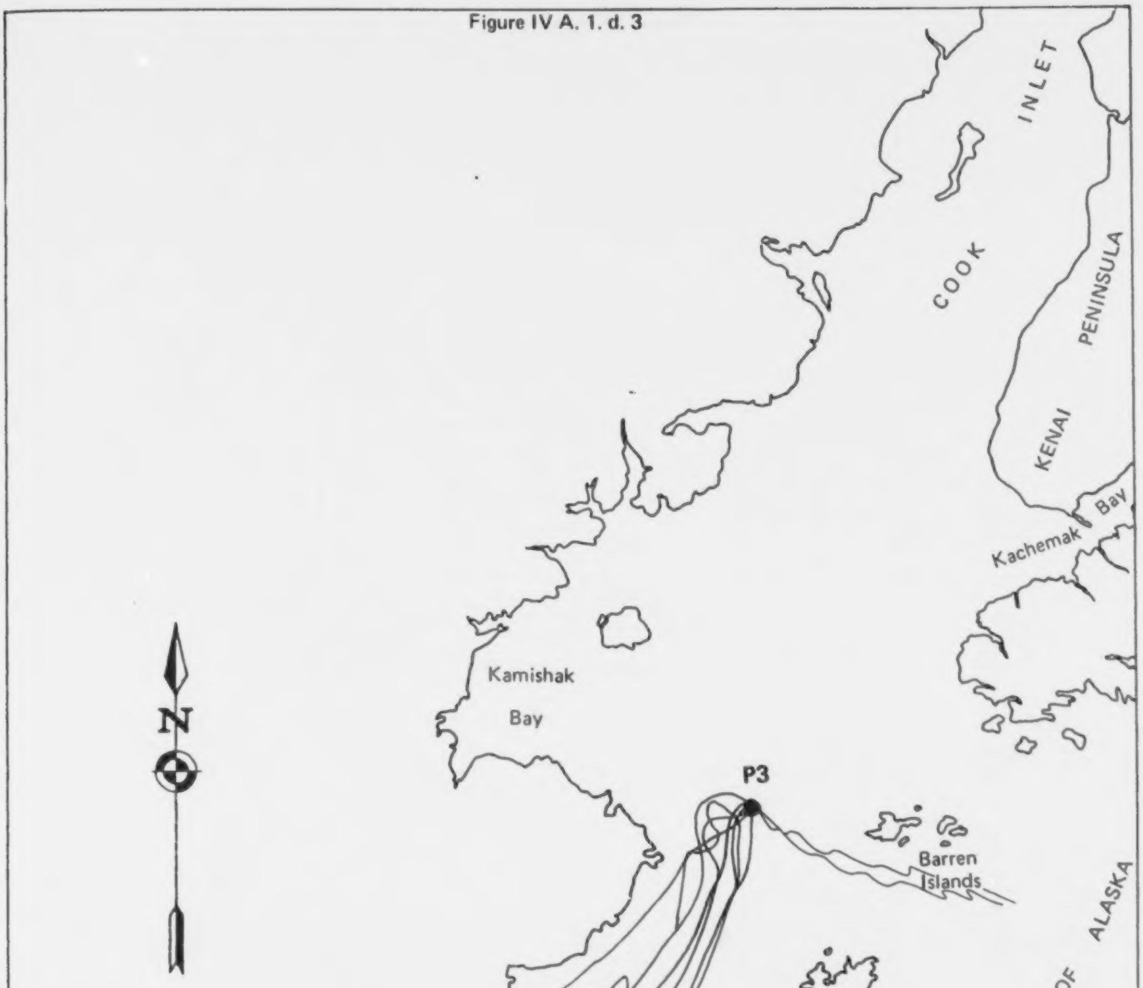
Barren Islands
GULF OF ALASKA
Afognak Island
SHELIKOF STRAIT
KODIAK ISLAND

TEN SAMPLE TRAJECTORIES LAUNCHED FROM LINE SEGMENTS P 7 DURING WINTER CONDITIONS (OCTOBER – MARCH)

Source: Schlueter, R.S. & Rauw, C.I., 1980.

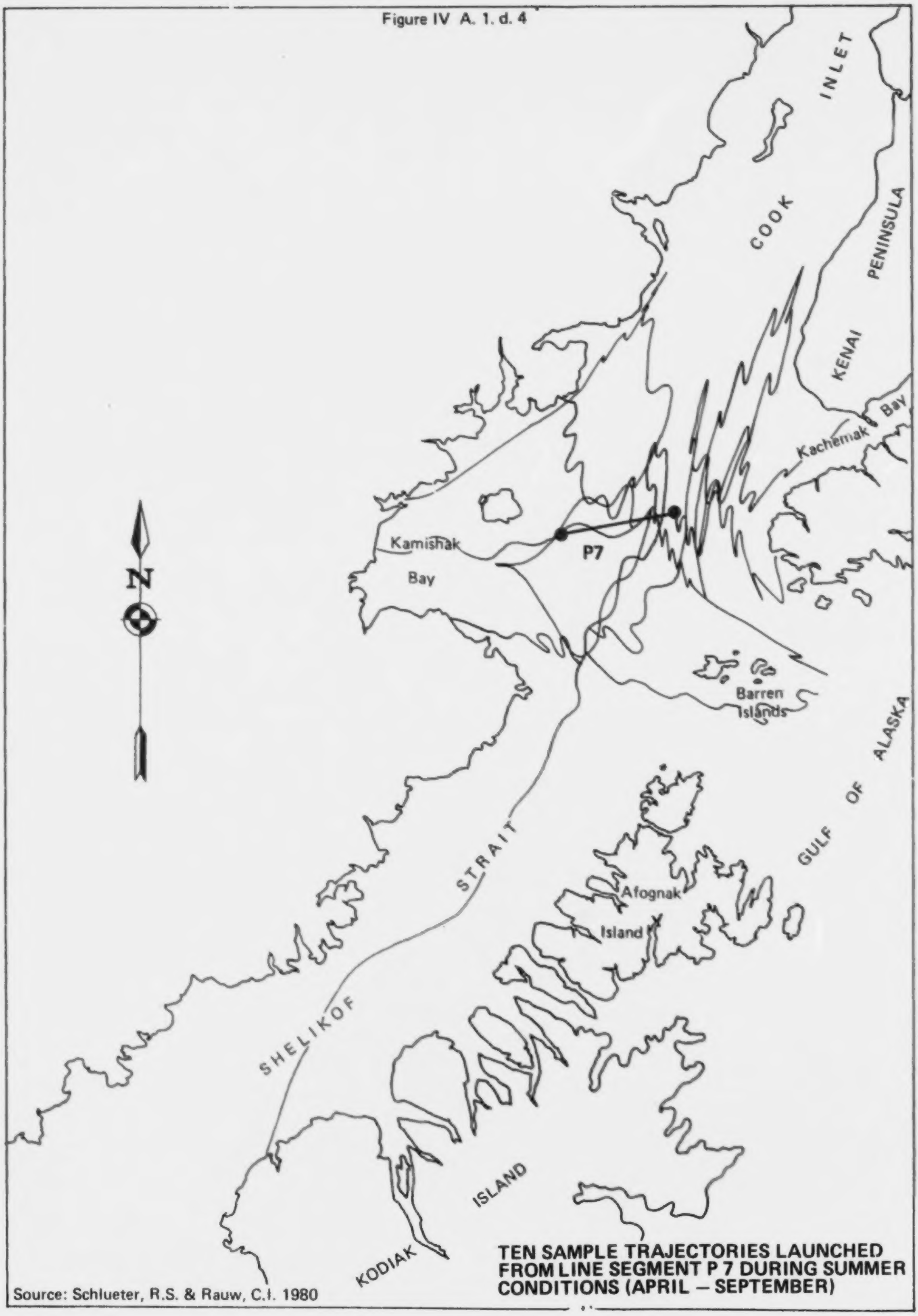
Figure IV A. 1. d. 3


COOK
INLET
KENAI
PENINSULA
Kachemak Bay
Kamishak
Bay
N
P3
Barren
Islands
GULF OF ALASKA
STRAIT
Afognak
Island
SHELIKOF
KODIAK
ISLAND

Source: Schlueter, R. S. & Rauw, C.I., 1980

TEN SAMPLE TRAJECTORIES LAUNCHED FROM POINT SOURCE P 3 DURING WINTER CONDITIONS (OCTOBER – MARCH)

Figure IV A. 1. d. 4


COOK INLET
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Barren Islands
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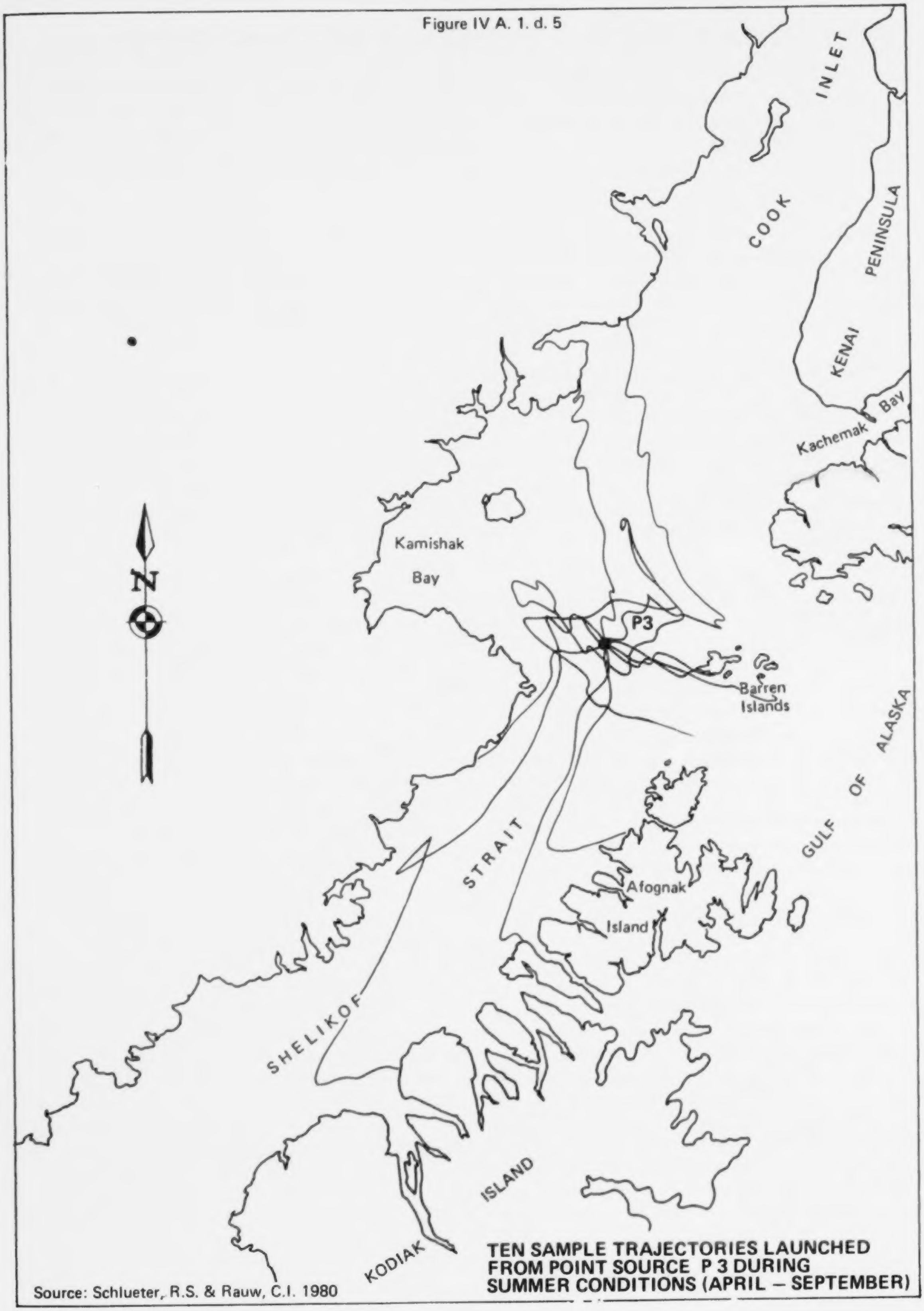
SHELIKOF STRAIT
Afognak Island
KODIAK ISLAND

TEN SAMPLE TRAJECTORIES LAUNCHED FROM LINE SEGMENT P 7 DURING SUMMER CONDITIONS (APRIL – SEPTEMBER)

Source: Schlueter, R.S. & Rauw, C.I. 1980

Figure IV A. 1. d. 5


COOK INLET
KENAI PENINSULA
Kachemak Bay
Kamishak Bay
P3
Barren Islands
GULF OF ALASKA
SHELIKOF STRAIT
Afognak Island
KODIAK ISLAND
N

TEN SAMPLE TRAJECTORIES LAUNCHED FROM POINT SOURCE P 3 DURING SUMMER CONDITIONS (APRIL – SEPTEMBER)

Source: Schlueter, R.S. & Rauw, C.I. 1980

Combined Analysis of Oilspill Occurrence and Oilspill Trajectory Simulations: Data in table 1 of appendix D indicate the probabilities of different numbers of oilspills greater than 1,000 barrels occurring during the production life of the field. Tables 2 through 7 (appendix D) indicate the conditional probabilities that targets or land segments will be contacted, given that an oilspill occurs. Combining these two sets of probabilities yields the final probabilities (tables 8-31, appendix D) that oilspills will occur and contact targets or land segments.

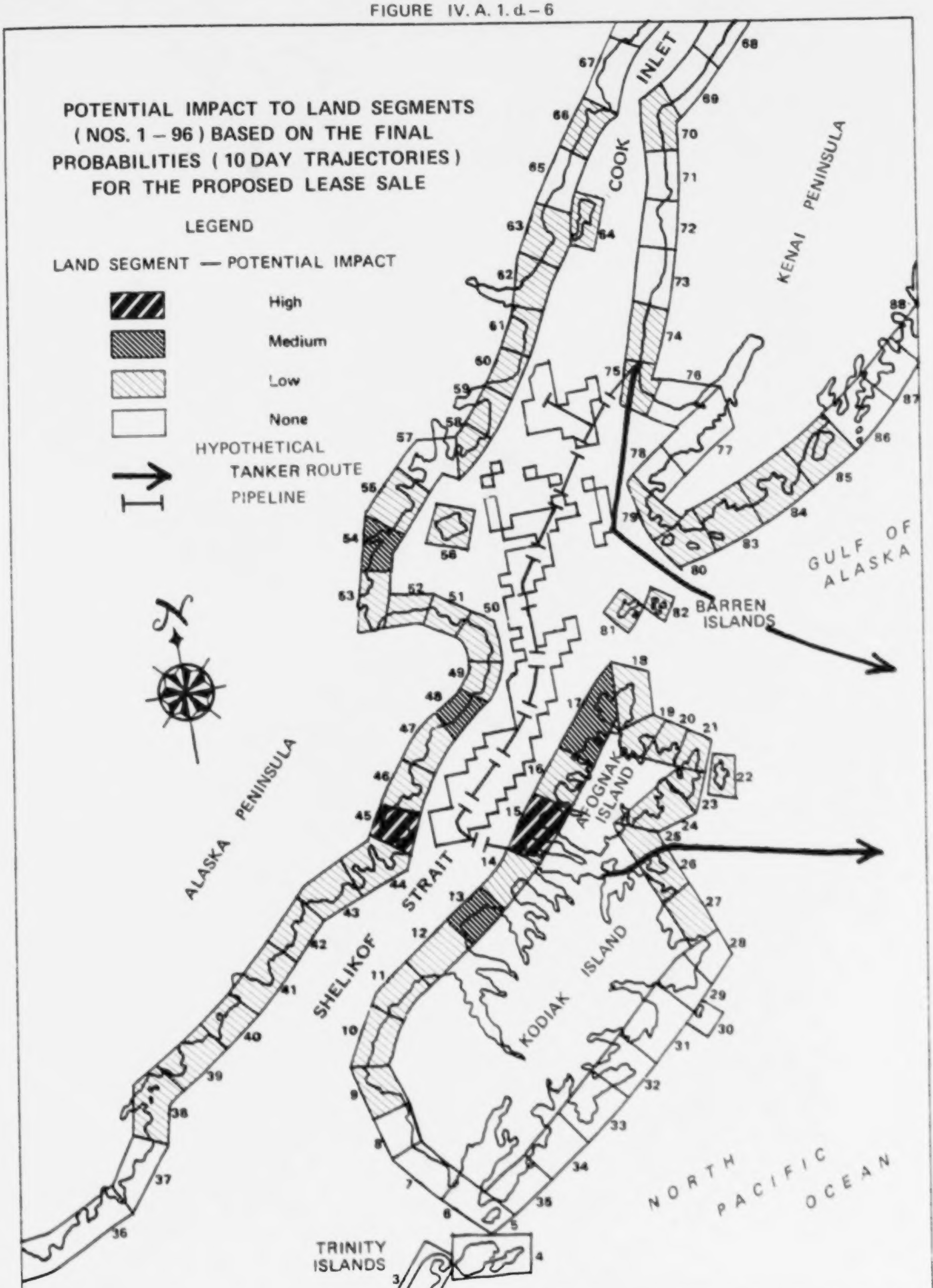
Conditional probabilities depend only on the winds and currents of the study area--elements over which the decisionmaker has no control. Final probabilities on the other hand, will depend not only on the physical conditions, but also the expected recoverable oil resource as determined by the decisionmaker, i.e., choosing the proposal or one of the alternatives.

A relative scale using the final probabilities was used to identify levels of potential impact. Land segments which had a greater than 20 percent final probability of contact by an oilspill were classified as high potential impact areas. Land segments which had an 11 to 20 percent final probability of contact were designated as moderate potential impact areas. Those areas with less than an 11 percent final probability of contact were designated areas of low impact potential. These impact ranges were somewhat arbitrarily selected to provide a reasonable basis upon which impacts from oilspills could be analyzed.

Compared to the proposal (fig. IV.A.1.d.-6), alternatives IV (fig. IV.A.1.d.-7) and V (fig. IV.A.1.d.-8) offer significant reduction in the potential impact to land segments primarily in Shelikof Strait. For the proposal, there is a 77 percent chance of an oilspill contacting land within 3 days, and a 94 percent chance within 10 days. For alternative IV there is a 38 percent chance of an oilspill contacting land in 3 days and a 69 percent chance in 10 days. For alternative V there is a 32 percent chance of an oilspill contacting land in 3 days and a 59 percent chance in 10 days (table IV.A.1.d.-1). For 3-day trajectories then, alternatives IV and V reduce the potential impacts of the proposal by 39 percent and 45 percent respectively. For 10-day trajectories, the reduction is 25 percent and 36 percent. For a more complete assessment of the types of impacts associated with these land segments, see sections IV.A.2 through IV.A.7.

Compared to the proposal, alternative VI would reduce the probability of an oilspill reaching shore by 18 percent for 3-day trajectories and by 19 percent for 10-day trajectories. Alternative VI would result in a greater portion of the Shelikof Strait being contacted by oilspills than would occur with alternatives IV or V (fig. IV.A.1.d.-7 and -8). Less of the coast would be contacted by oil than would occur with the proposal. Two land segments would face relatively high potential impact with this alternative. The west bank of Shelikof Strait at land segment 45, which extends from Kukak Bay to Kuliak Bay, has a relatively high potential for impact. On the east bank of Shelikof Strait, land segment 15, which extends from Malina Bay to Kupreanof Strait, has a moderate potential impact. Overall, however, the magnitude of impacts from potential oilspills would be low for this alternative and would be less than for the proposal. For a more complete assessment of impacts associated with land segments, refer to sections IV.A.2. through IV.A.7.

FIGURE IV. A. 1. d. – 6

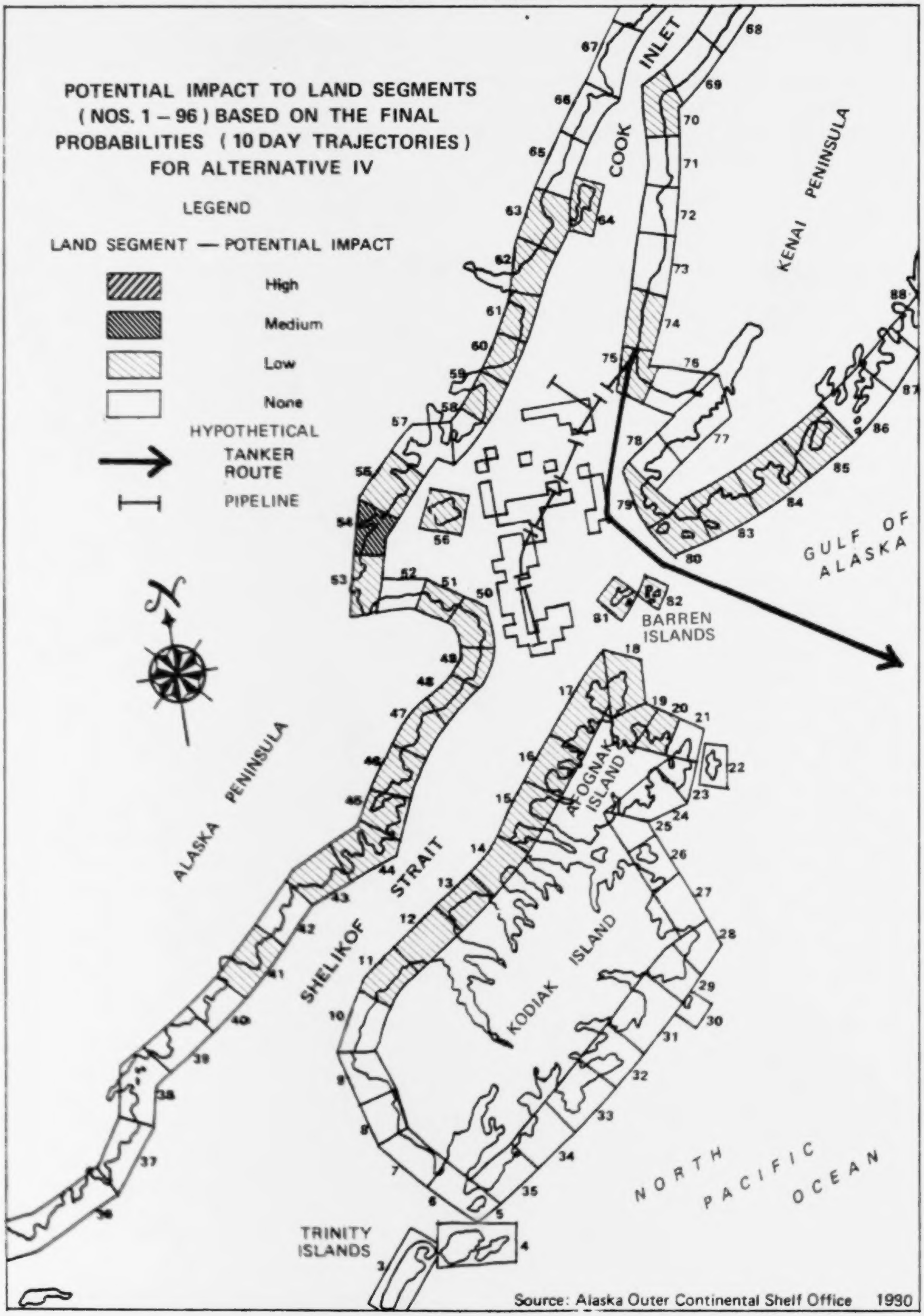


POTENTIAL IMPACT TO LAND SEGMENTS (NOS. 1 – 96) BASED ON THE FINAL PROBABILITIES (10 DAY TRAJECTORIES) FOR THE PROPOSED LEASE SALE

LEGEND
LAND SEGMENT — POTENTIAL IMPACT
High
Medium
Low
None
HYPOTHETICAL
TANKER ROUTE
PIPELINE
COOK INLET
KENAI PENINSULA
GULF OF ALASKA
BARREN ISLANDS
ALASKA PENINSULA
SHELIKOF STRAIT
AFOGNAK ISLAND
KODIAK ISLAND
NORTH PACIFIC OCEAN
TRINITY ISLANDS

Source: Alaska Outer Continental Shelf Office 1980

FIGURE IV. A. 1. d.– 7


POTENTIAL IMPACT TO LAND SEGMENTS (NOS. 1 – 96) BASED ON THE FINAL PROBABILITIES (10 DAY TRAJECTORIES) FOR ALTERNATIVE IV
LEGEND
LAND SEGMENT — POTENTIAL IMPACT
High
Medium
Low
None
HYPOTHETICAL TANKER ROUTE
PIPELINE
COOK INLET
KENAI PENINSULA
GULF OF ALASKA
BARREN ISLANDS
ALASKA PENINSULA
SHELIKOF STRAIT
AFOGNAK ISLAND
KODIAK ISLAND
NORTH PACIFIC OCEAN
TRINITY ISLANDS
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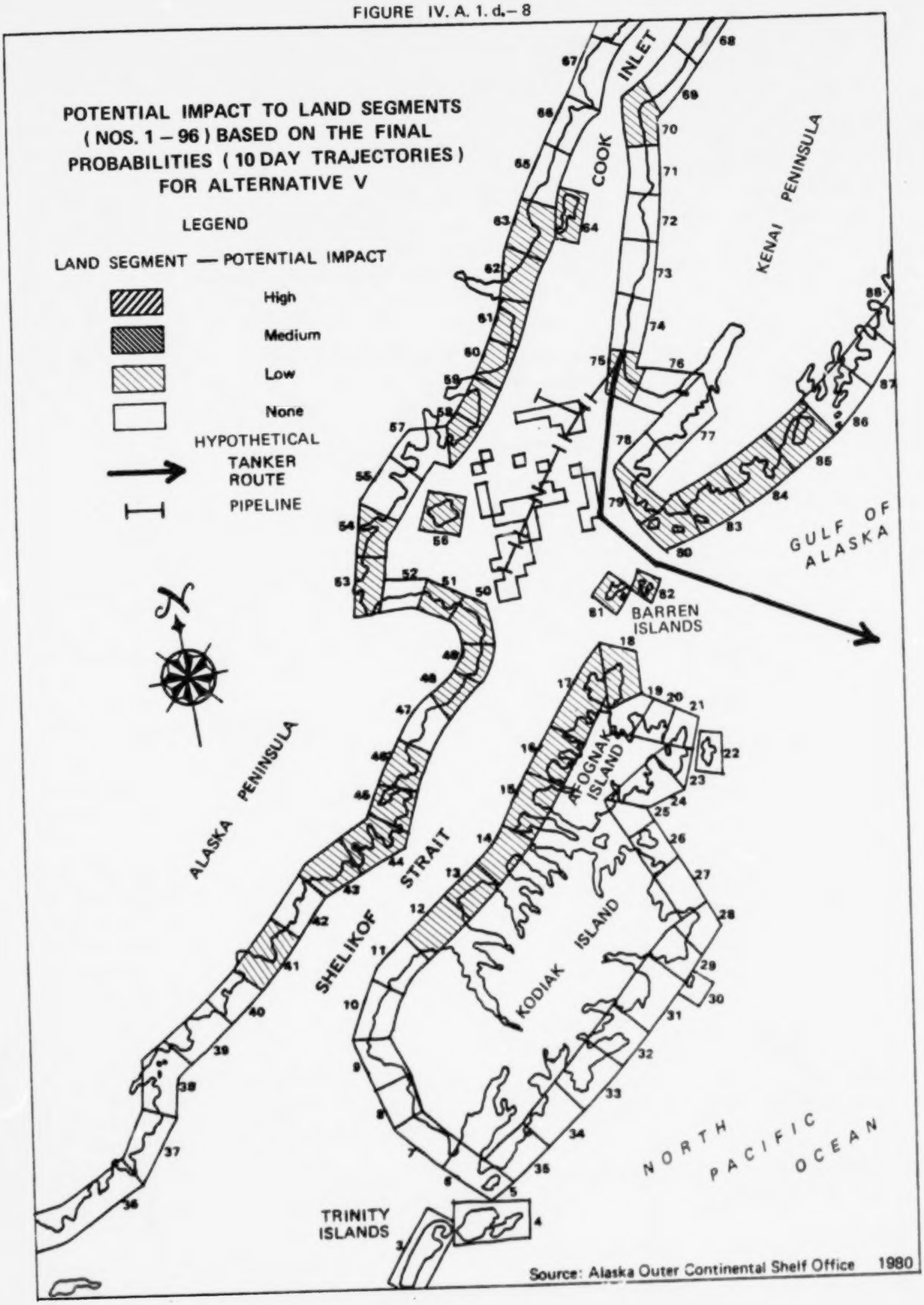
Source: Alaska Outer Continental Shelf Office 1980

FIGURE IV. A. 1. d.– 8



POTENTIAL IMPACT TO LAND SEGMENTS (NOS. 1 – 96) BASED ON THE FINAL PROBABILITIES (10 DAY TRAJECTORIES) FOR ALTERNATIVE V

LEGEND
LAND SEGMENT — POTENTIAL IMPACT
High
Medium
Low
None
HYPOTHETICAL TANKER ROUTE
PIPELINE
N
COOK INLET
KENAI PENINSULA
GULF OF ALASKA
BARREN ISLANDS
AFOGNAK ISLAND
KODIAK ISLAND
SHELIKOF STRAIT
ALASKA PENINSULA
TRINITY ISLANDS
NORTH PACIFIC OCEAN
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Source: Alaska Outer Continental Shelf Office 1980

Table IV.A.1.d.-1
Final Probabilities (percent chance) of an Oilspill
Contacting Land Within 3 Days, 10 Days, and 30 Days
Over the Production Life of the Proposed Lease Area

	3 Days		10 Days		30 Days	
	Proposed	Cumulative*	Proposed	Cumulative*	Proposed	Cumulative*
Proposal	77	95	94	99	96	99
Alternative IV	38	85	69	99	74	99
Alternative V	32	83	59	99	65	99
Alternative VI	59	95	75	100	80	100
Transportation						
Alternative A	72	93	95	99	97	99
Alternative B	72	93	94	99	96	99
Alternative C	78	95	93	99	96	99

* Cumulative includes existing leases in Cook Inlet, proposed leases, and existing tanking from upper Cook Inlet.

Cumulative Potential Impacts: Cumulative potential impacts were considered with the estimated resource development of the existing leases (CI) and with the existing tankering from upper Cook Inlet. Based on the above relative scale of potential impact, the existing leases alone yield high potential impact for Kamishak Bay and moderate potential impact for the following: Shelikof Strait (segments 17 and 45), Anchor Point (segment 75), the Barren Islands (segment 81) and in and around Chinitna Bay (segments 58 and 59) (fig. IV.A.1.d.-9).

The proposal plus the existing Cook Inlet leases produce 9 high and 11 moderately impacted land segments from the 10-day trajectories (fig. IV.A.1.d.-10). Alternative IV yields 6 high and 9 moderately impacted land segments (fig. IV.A.1.d.-11). Alternative V produces 5 high and 7 moderate impact areas (fig. IV.A.1.d.-12).

When considering the cumulative effects of the proposal with the existing leases in Cook Inlet, there is a 95 percent chance of an oilspill contacting land in 3 days and a 99 percent chance in 10 days. Alternatives IV and V reduce the cumulative probabilities only about 11 percent for the 3-day trajectory and are not significantly different for the 10-day trajectory (table IV.A.1.d.-1).

The addition of data concerning existing tankering from upper Cook Inlet to the oilspill risk analysis significantly increases the risk of the proposal. Additional high impact areas are produced at Kalgin Island (segment 64), north of Chinitna Bay (segment 60), English Bay (segment 76) and Viekoda and Uganik Bays (segment 14, fig. IV.A.1.d.-13).

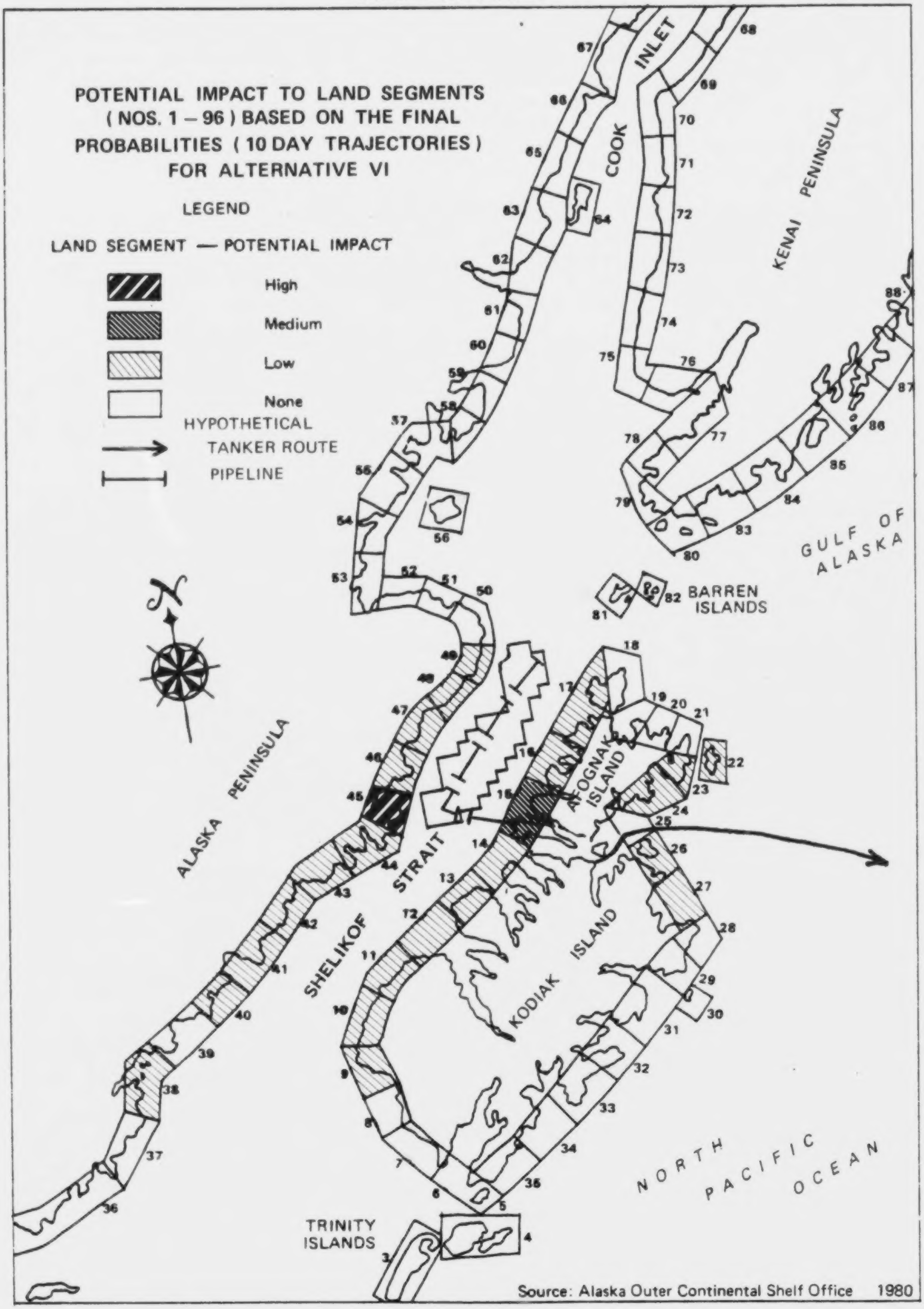
The potential of an oilspill from the existing leases and tankering in Cook Inlet with respect to alternative VI increases the potential impact to both the east and west banks of Shelikof Strait (fig. IV.A.1.d.-14). Based on 10-day trajectories, the west bank of Shelikof Strait (land segments 44-45) has a 42 percent chance of contact by an oilspill. When potential spills from existing leases and tankering are considered there is a 28 percent increase or 70 percent chance, of oil contacting the west bank. Along the east bank (land segments 12-18) there is a 33 percent chance of contact by an oilspill from the existing leases and tankering activity.

A treatment of transportation scenarios different from those of the proposal by the oilspill risk model demonstrated very little difference in the areas of potential impact or in the magnitude of impact with respect to land segments (table IV.A.1.d.-1). For the four transportation scenarios analyzed in this environmental statement, the probability of an oilspill contacting a land segment ranged from 72 to 78 percent in 3 days, and 93 to 95 percent in 10 days.

Cumulative effects with respect to the proposal (fig. IV.A.1.d.-15) produce similar levels of potential impact for each of the transportation scenarios (fig. IV.A.1.d.-16 through -18). Cumulative final probabilities for the four scenarios range from 93 to 97 percent for 3-day trajectories and 99 percent for 10- and 30-day trajectories (table IV.A.1.d.-1).

For an evaluation of the relative impacts and feasibility of the transportation scenarios, refer to section IV.A.2.m.

FIGURE IV. A. 1. d.– 9

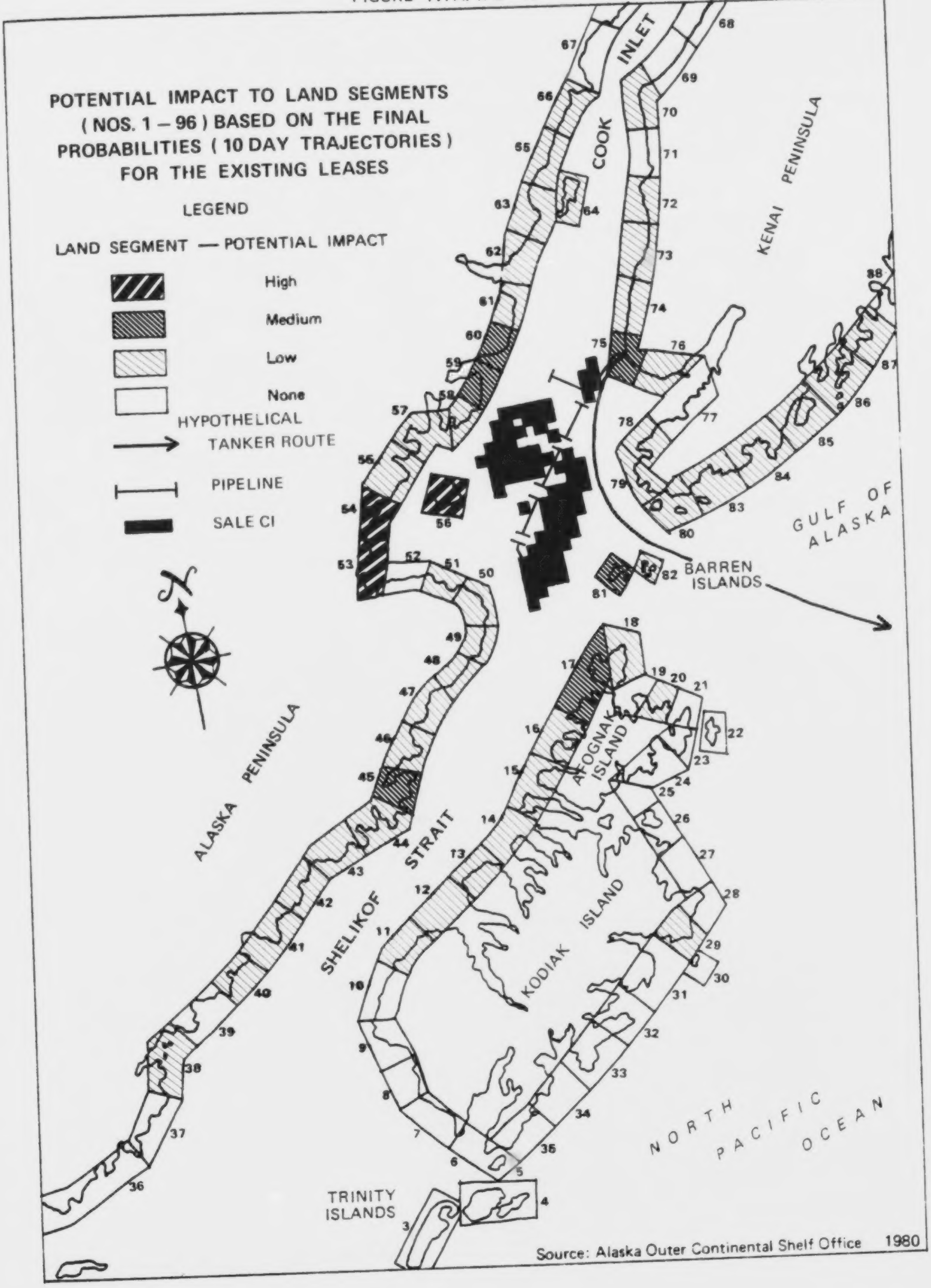


POTENTIAL IMPACT TO LAND SEGMENTS (NOS. 1 – 96) BASED ON THE FINAL PROBABILITIES (10 DAY TRAJECTORIES) FOR ALTERNATIVE VI

LEGEND
LAND SEGMENT — POTENTIAL IMPACT
High
Medium
Low
None
HYPOTHETICAL
TANKER ROUTE
PIPELINE
COOK INLET
KENAI PENINSULA
GULF OF ALASKA
BARREN ISLANDS
ALASKA PENINSULA
SHELIKOF STRAIT
AFOGNAK ISLAND
KODIAK ISLAND
TRINITY ISLANDS
NORTH PACIFIC OCEAN

Source: Alaska Outer Continental Shelf Office 1980

FIGURE IV. A. 1. d.– 10



POTENTIAL IMPACT TO LAND SEGMENTS (NOS. 1 – 96) BASED ON THE FINAL PROBABILITIES (10 DAY TRAJECTORIES) FOR THE EXISTING LEASES

LEGEND
LAND SEGMENT — POTENTIAL IMPACT
▨ High
▨ Medium
▨ Low
☐ None
HYPOTHETICAL TANKER ROUTE
PIPELINE
SALE CI
COOK INLET
KENAI PENINSULA
GULF OF ALASKA
BARREN ISLANDS
ALASKA PENINSULA
SHELIKOF STRAIT
AFOGNAK ISLAND
KODIAK ISLAND
TRINITY ISLANDS
NORTH PACIFIC OCEAN
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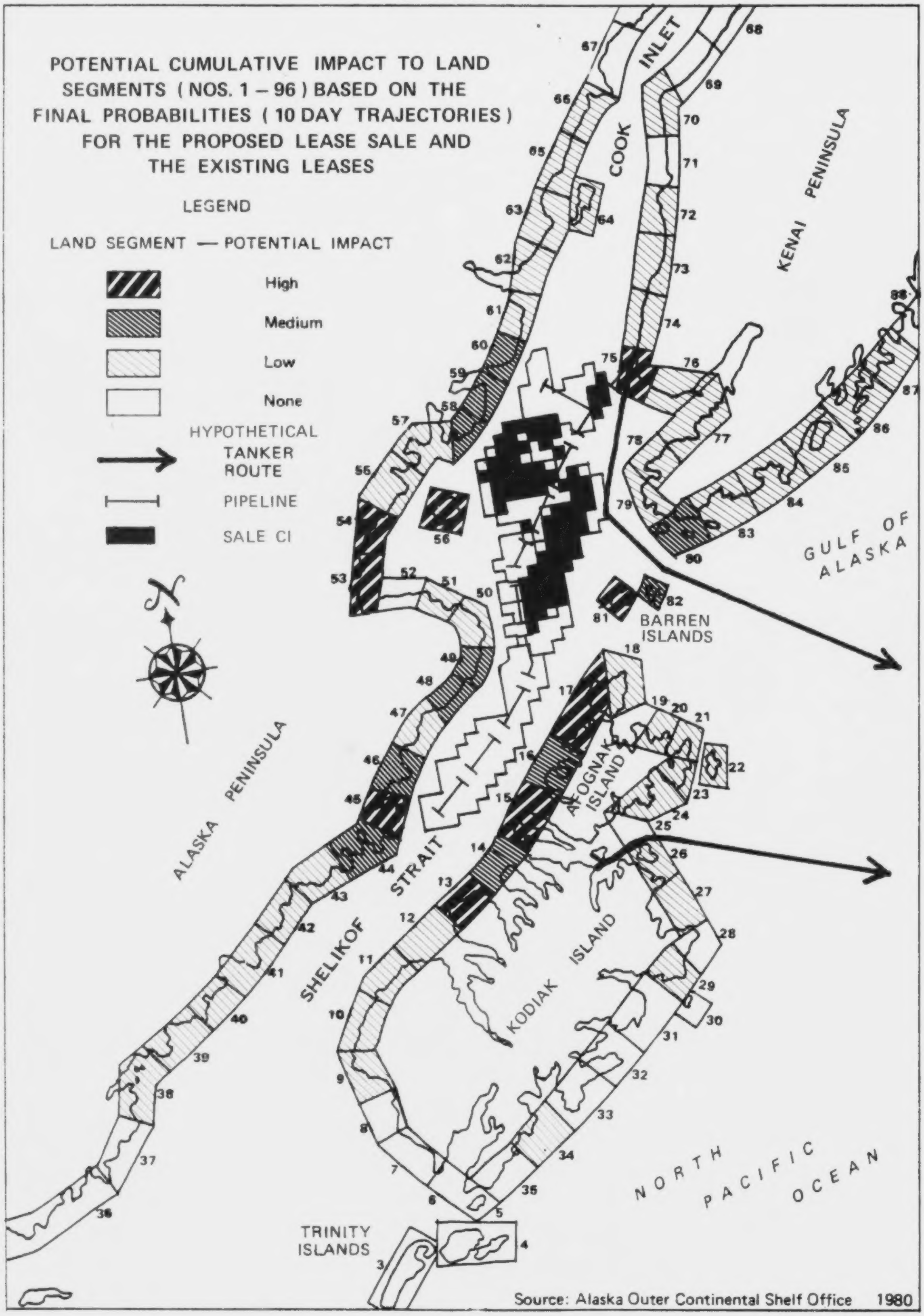
Source: Alaska Outer Continental Shelf Office 1980

FIGURE IV. A. 1. d.– 11



POTENTIAL CUMULATIVE IMPACT TO LAND SEGMENTS (NOS. 1 – 96) BASED ON THE FINAL PROBABILITIES (10 DAY TRAJECTORIES) FOR THE PROPOSED LEASE SALE AND THE EXISTING LEASES

LEGEND
LAND SEGMENT — POTENTIAL IMPACT
High
Medium
Low
None
HYPOTHETICAL TANKER ROUTE
PIPELINE
SALE CI
COOK INLET
KENAI PENINSULA
GULF OF ALASKA
BARREN ISLANDS
ALASKA PENINSULA
SHELIKOF STRAIT
AFOGNAK ISLAND
KODIAK ISLAND
TRINITY ISLANDS
NORTH PACIFIC OCEAN
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36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70
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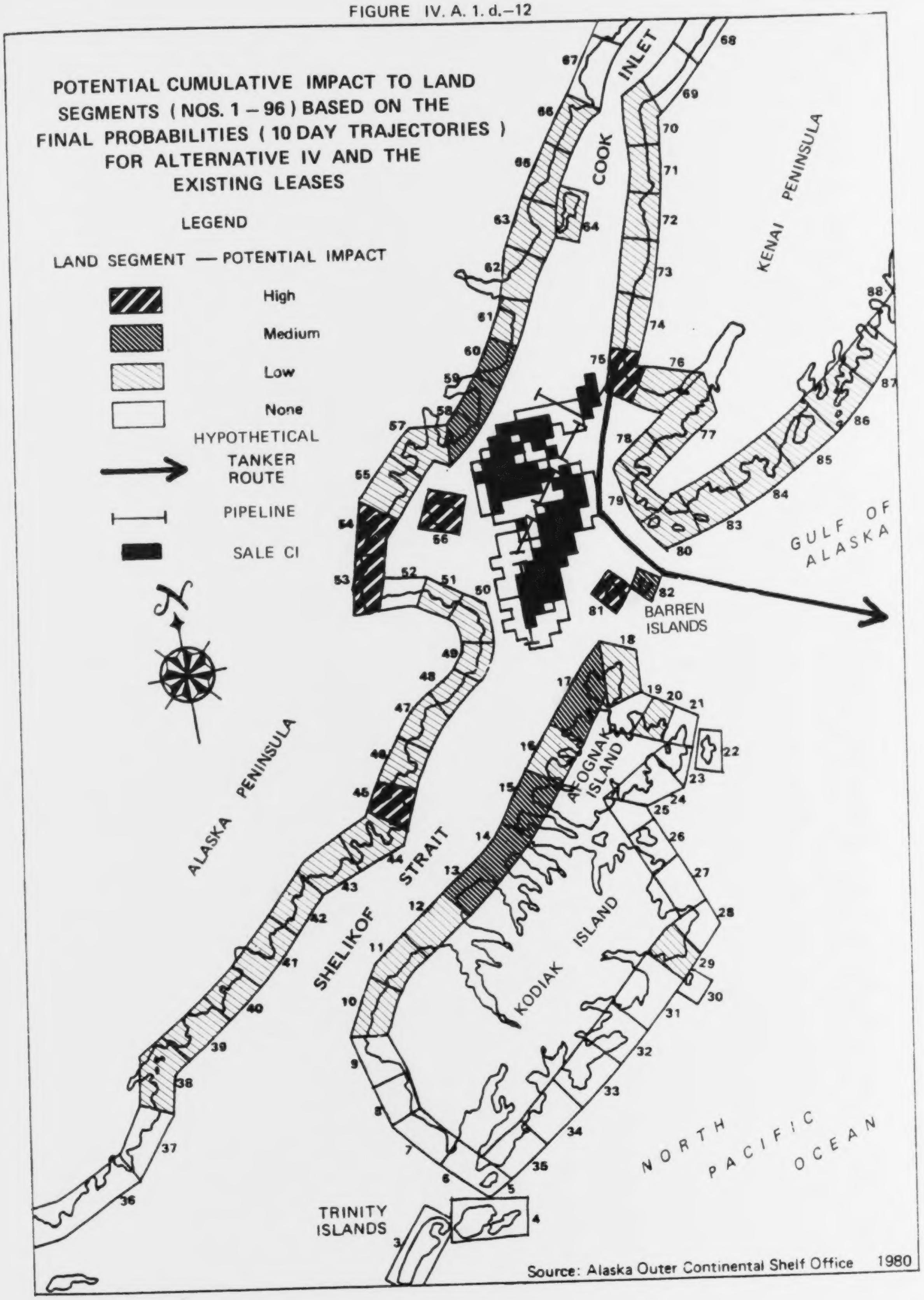
Source: Alaska Outer Continental Shelf Office 1980

FIGURE IV. A. 1. d.–12


POTENTIAL CUMULATIVE IMPACT TO LAND SEGMENTS (NOS. 1 – 96) BASED ON THE FINAL PROBABILITIES (10 DAY TRAJECTORIES) FOR ALTERNATIVE IV AND THE EXISTING LEASES
LEGEND
LAND SEGMENT — POTENTIAL IMPACT
High
Medium
Low
None
HYPOTHETICAL TANKER ROUTE
PIPELINE
SALE CI
N
COOK INLET
KENAI PENINSULA
GULF OF ALASKA
BARREN ISLANDS
AFOGNAK ISLAND
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ALASKA PENINSULA
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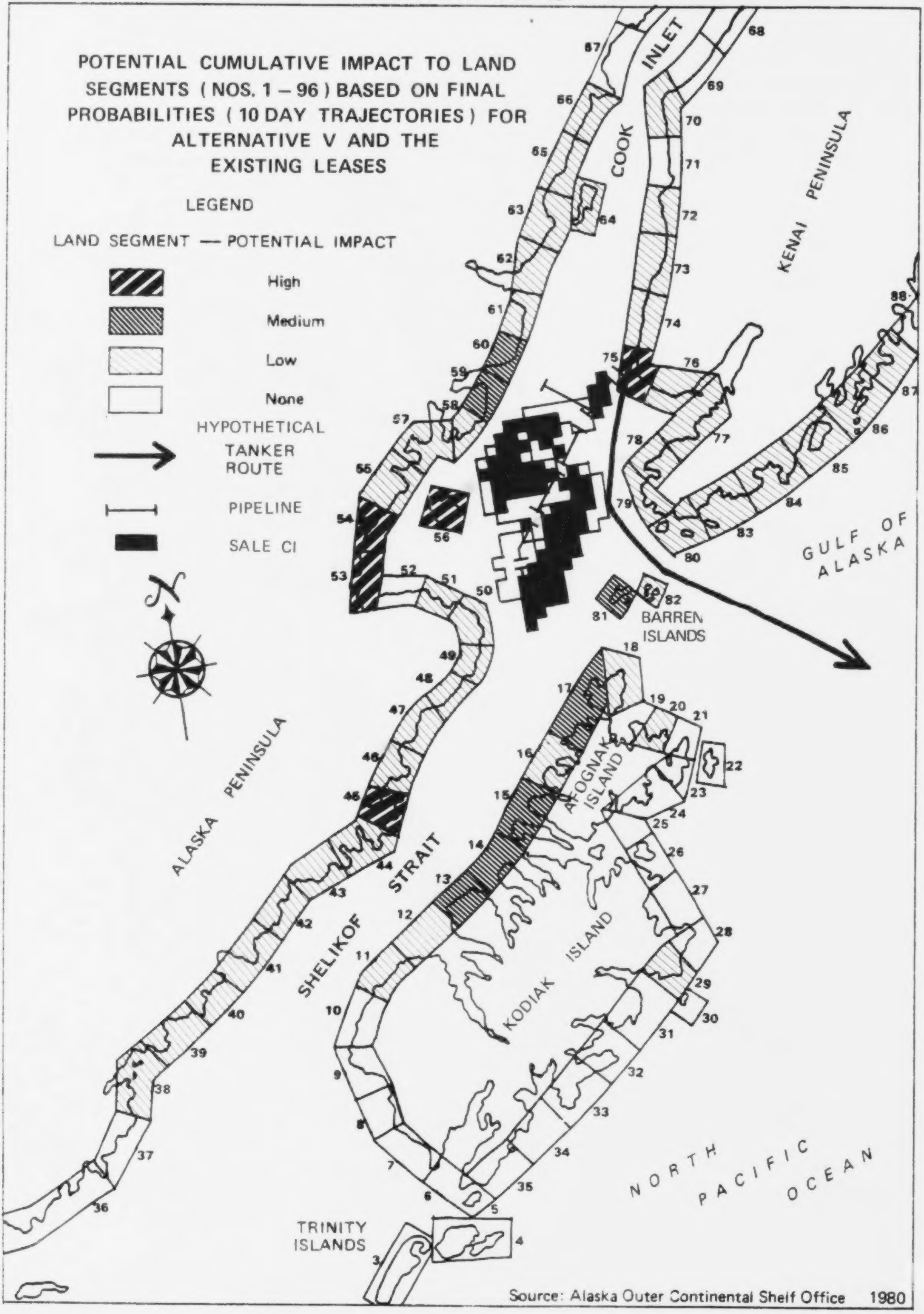
Source: Alaska Outer Continental Shelf Office 1980

FIGURE IV. A. 1. d.– 13



POTENTIAL CUMULATIVE IMPACT TO LAND SEGMENTS (NOS. 1 – 96) BASED ON FINAL PROBABILITIES (10 DAY TRAJECTORIES) FOR ALTERNATIVE V AND THE EXISTING LEASES

LEGEND
LAND SEGMENT — POTENTIAL IMPACT
High
Medium
Low
None
HYPOTHETICAL TANKER ROUTE
PIPELINE
SALE CI
COOK INLET
KENAI PENINSULA
GULF OF ALASKA
BARREN ISLANDS
ALASKA PENINSULA
SHELIKOF STRAIT
AFOGNAK ISLAND
KODIAK ISLAND
NORTH PACIFIC OCEAN
TRINITY ISLANDS
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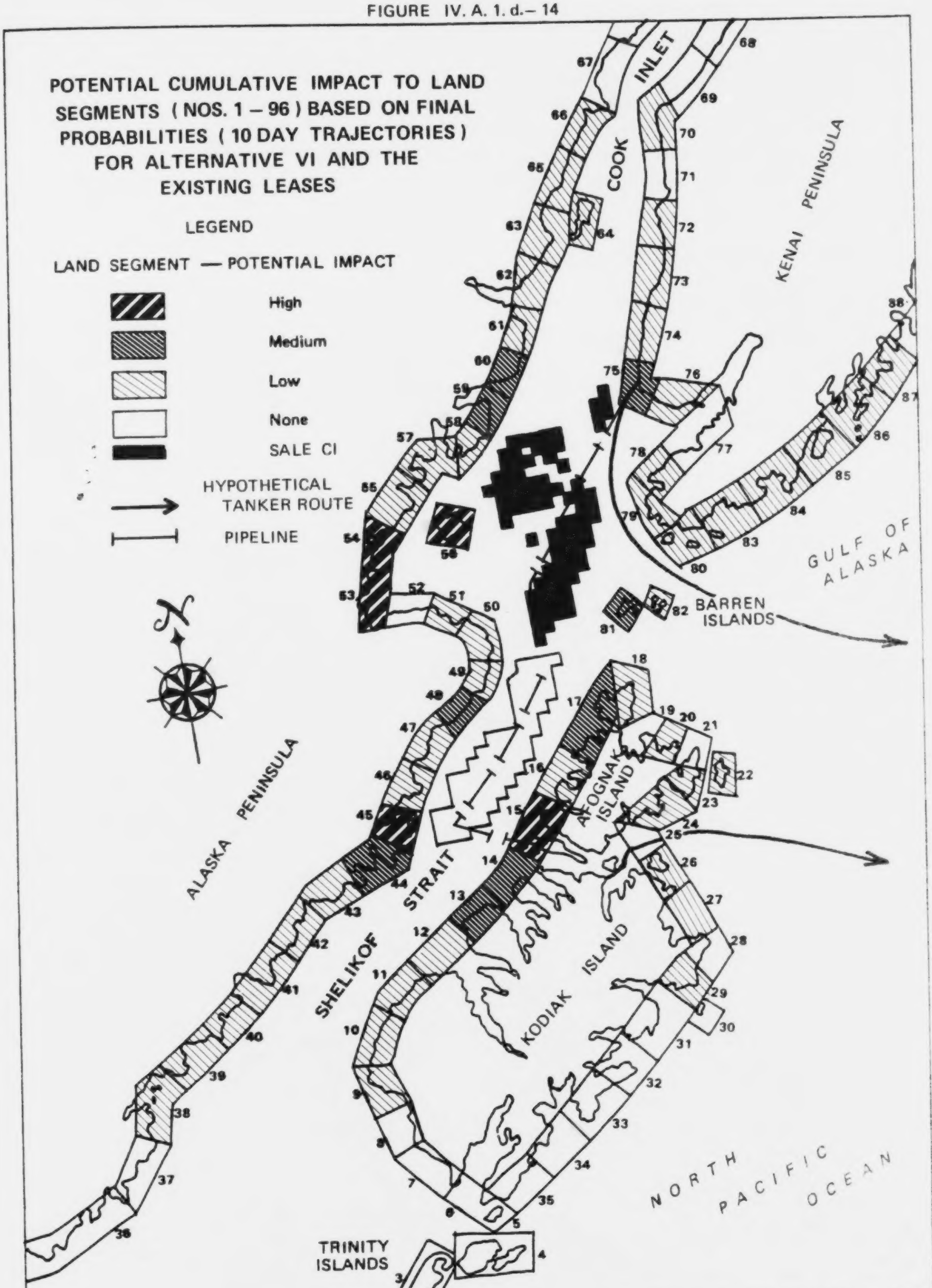
Source: Alaska Outer Continental Shelf Office 1980

FIGURE IV. A. 1. d.– 14



POTENTIAL CUMULATIVE IMPACT TO LAND SEGMENTS (NOS. 1 – 96) BASED ON FINAL PROBABILITIES (10 DAY TRAJECTORIES) FOR ALTERNATIVE VI AND THE EXISTING LEASES

LEGEND
LAND SEGMENT — POTENTIAL IMPACT
High
Medium
Low
None
SALE CI
HYPOTHETICAL TANKER ROUTE
PIPELINE
COOK INLET
KENAI PENINSULA
GULF OF ALASKA
BARREN ISLANDS
ALASKA PENINSULA
SHELIKOF STRAIT
AFOGNAK ISLAND
KODIAK ISLAND
NORTH PACIFIC OCEAN
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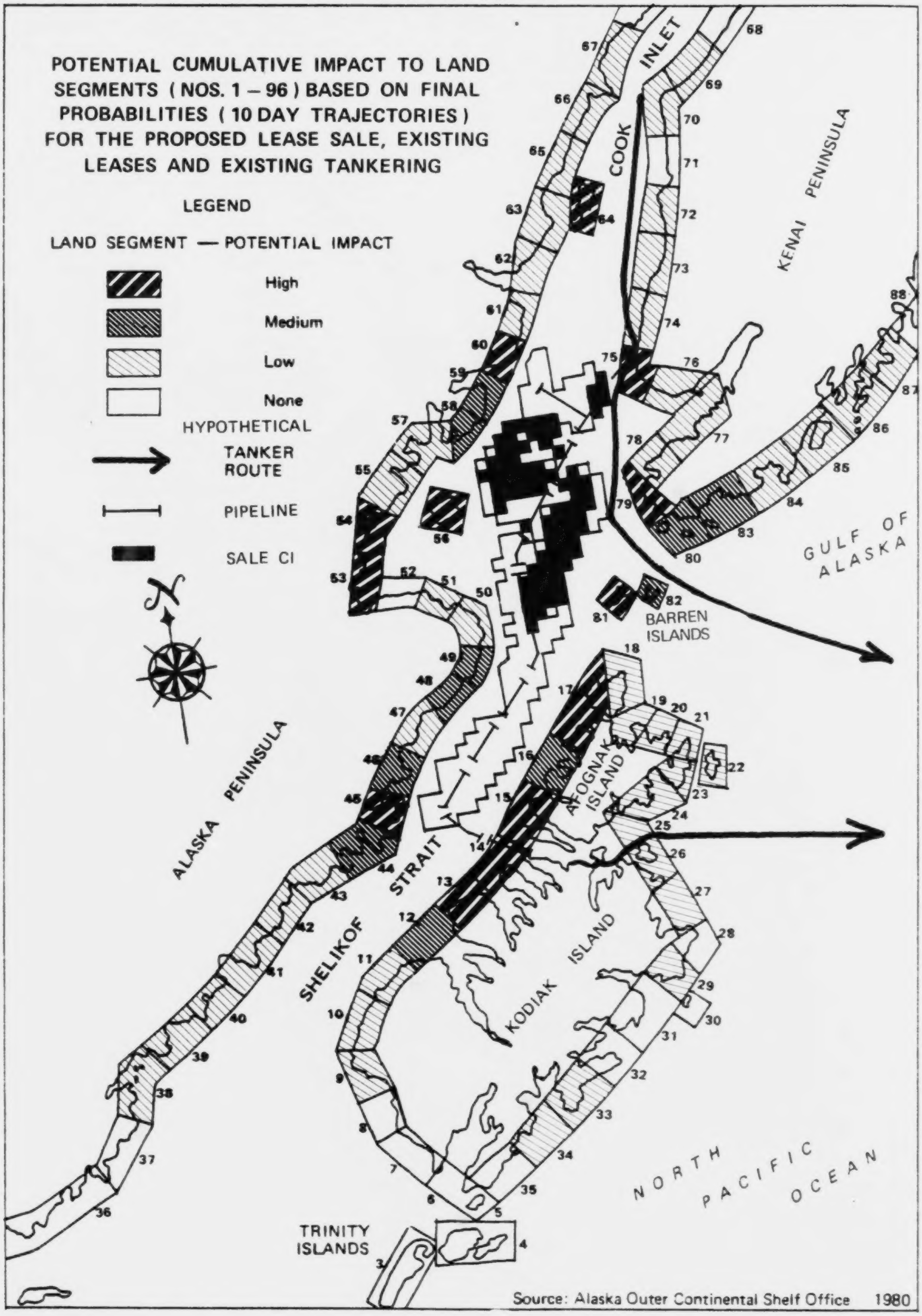
Source: Alaska Outer Continental Shelf Office 1980

FIGURE IV. A. 1. d.– 15



POTENTIAL CUMULATIVE IMPACT TO LAND SEGMENTS (NOS. 1 – 96) BASED ON FINAL PROBABILITIES (10 DAY TRAJECTORIES) FOR THE PROPOSED LEASE SALE, EXISTING LEASES AND EXISTING TANKERING

LEGEND
LAND SEGMENT — POTENTIAL IMPACT
High
Medium
Low
None
HYPOTHETICAL TANKER ROUTE
PIPELINE
SALE CI
N
COOK INLET
KENAI PENINSULA
GULF OF ALASKA
BARREN ISLANDS
AFOGNAK ISLAND
KODIAK ISLAND
SHELIKOF STRAIT
ALASKA PENINSULA
TRINITY ISLANDS
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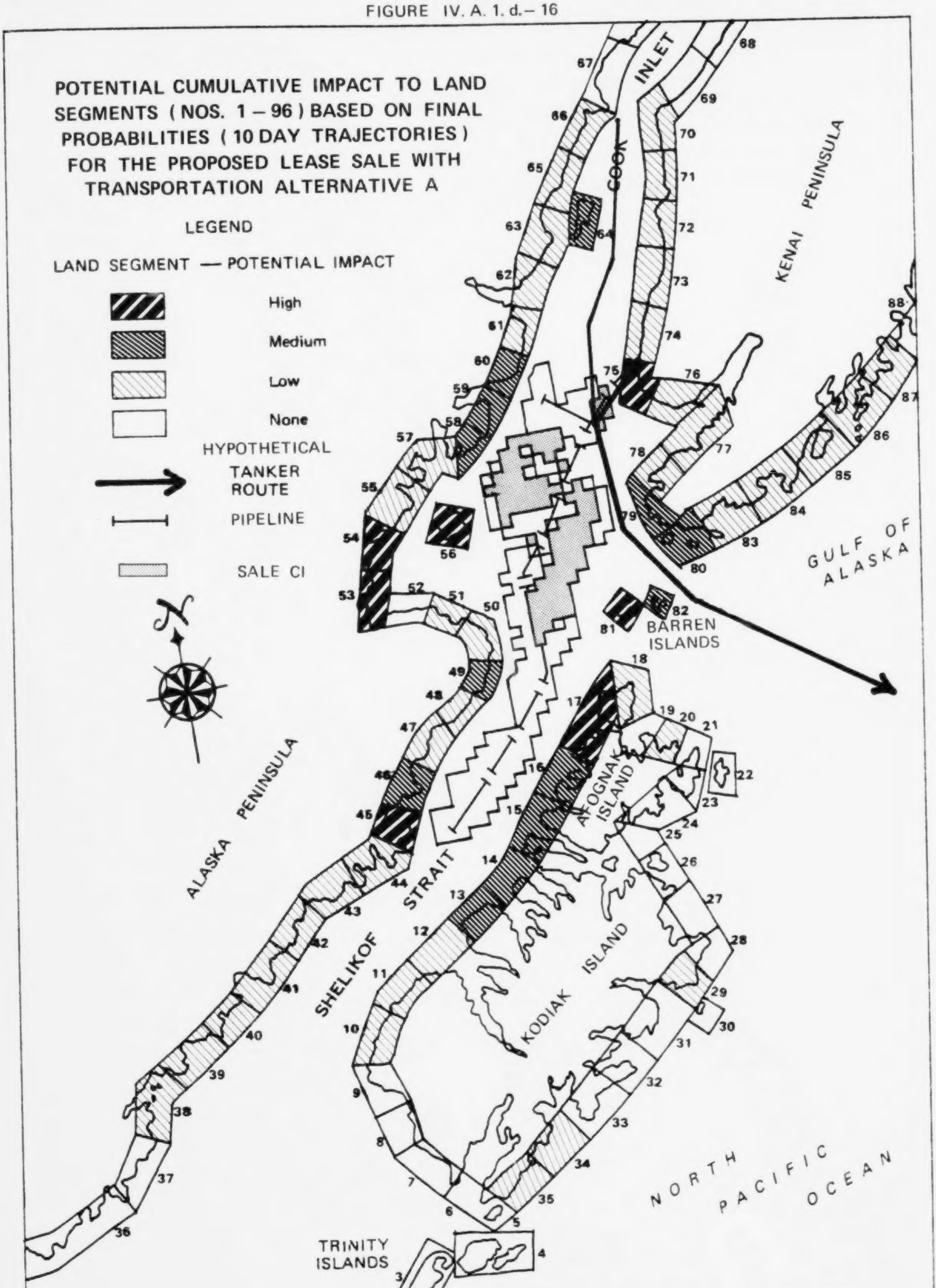
Source: Alaska Outer Continental Shelf Office 1980

FIGURE IV. A. 1. d.– 16



POTENTIAL CUMULATIVE IMPACT TO LAND SEGMENTS (NOS. 1 – 96) BASED ON FINAL PROBABILITIES (10 DAY TRAJECTORIES) FOR THE PROPOSED LEASE SALE WITH TRANSPORTATION ALTERNATIVE A

LEGEND
LAND SEGMENT — POTENTIAL IMPACT
▨ High
▨ Medium
▨ Low
☐ None
HYPOTHETICAL TANKER ROUTE
PIPELINE
SALE CI
COOK INLET
KENAI PENINSULA
GULF OF ALASKA
BARREN ISLANDS
AFOGNAK ISLAND
KODIAK ISLAND
SHELIKOF STRAIT
ALASKA PENINSULA
NORTH PACIFIC OCEAN
TRINITY ISLANDS
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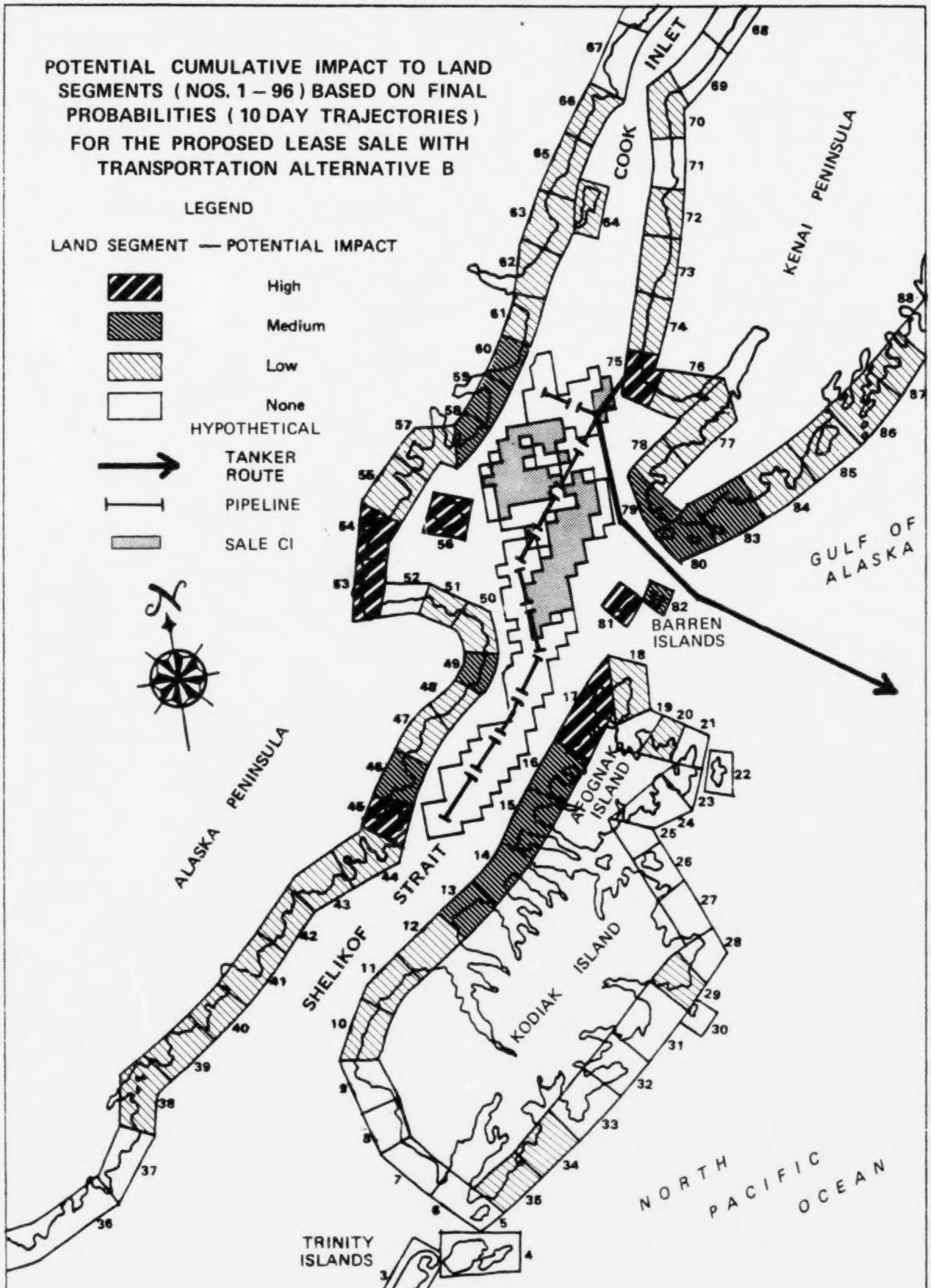
Source: Alaska Outer Continental Shelf Office 1980

FIGURE IV. A. 1. d.– 17



POTENTIAL CUMULATIVE IMPACT TO LAND SEGMENTS (NOS. 1 – 96) BASED ON FINAL PROBABILITIES (10 DAY TRAJECTORIES) FOR THE PROPOSED LEASE SALE WITH TRANSPORTATION ALTERNATIVE B

LEGEND
LAND SEGMENT — POTENTIAL IMPACT
High
Medium
Low
None
HYPOTHETICAL
TANKER ROUTE
PIPELINE
SALE CI
N
COOK INLET
KENAI PENINSULA
GULF OF ALASKA
BARREN ISLANDS
ALASKA PENINSULA
SHELIKOF STRAIT
AFOGNAK ISLAND
KODIAK ISLAND
NORTH PACIFIC OCEAN
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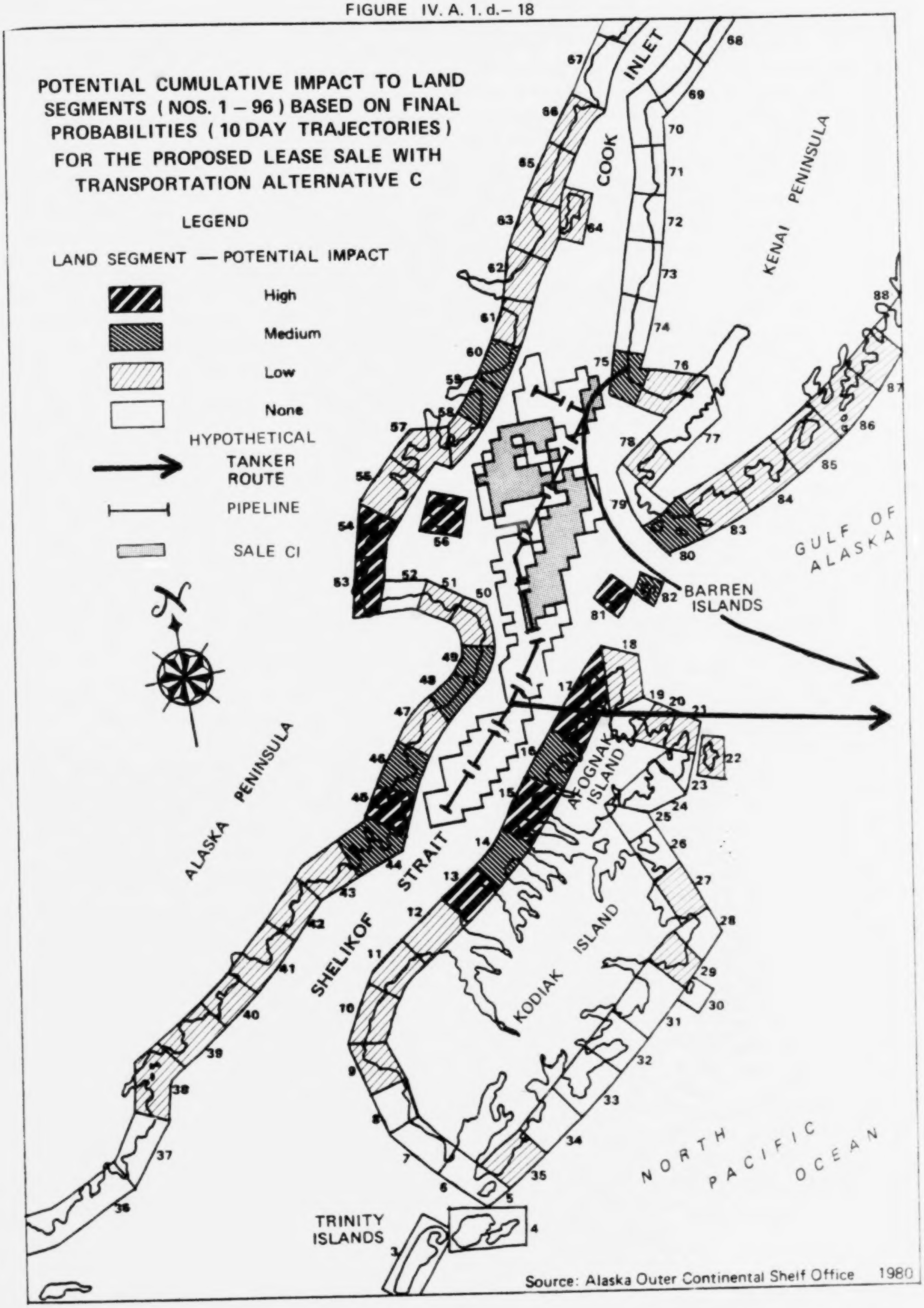
Source: Alaska Outer Continental Shelf Office 1980

FIGURE IV. A. 1. d.– 18



POTENTIAL CUMULATIVE IMPACT TO LAND SEGMENTS (NOS. 1 – 96) BASED ON FINAL PROBABILITIES (10 DAY TRAJECTORIES) FOR THE PROPOSED LEASE SALE WITH TRANSPORTATION ALTERNATIVE C

LEGEND
LAND SEGMENT — POTENTIAL IMPACT
High
Medium
Low
None
HYPOTHETICAL TANKER ROUTE
PIPELINE
SALE CI
COOK INLET
KENAI PENINSULA
GULF OF ALASKA
BARREN ISLANDS
ALASKA PENINSULA
SHELIKOF STRAIT
AFOGNAK ISLAND
KODIAK ISLAND
TRINITY ISLANDS
NORTH PACIFIC OCEAN
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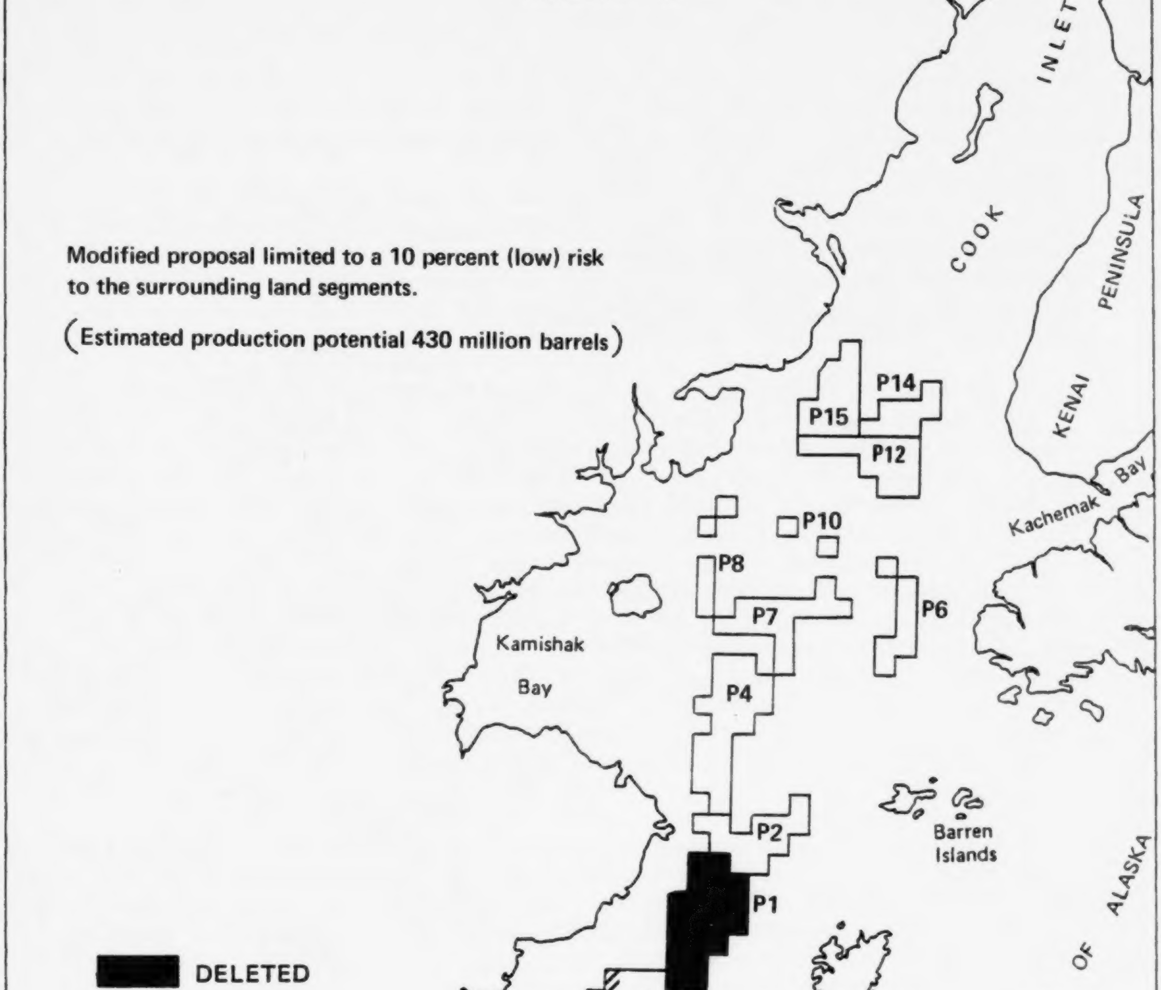
Source: Alaska Outer Continental Shelf Office 1980

Proposal Modifications Based Upon Limited Oilspill Risk: The optimal leasing plan is to choose from the list of tracts those areas which will offer the maximum potential production without exceeding acceptable levels of environmental risk. To assist the decisionmakers in this endeavor, the oilspill risk analysis of the proposal can be modified using linear programming techniques (Smith, et al., 1979). The analysis that follows is based on the objective to maximize petroleum resource production within subjectively established limits of environmental risk. If alternative objectives were able to be used, it is likely the analysis would produce a different treatment of block deletions. An example of an alternative objective would be to realize an acceptable relationship between petroleum resource production and fisheries production.

As previously shown, the major shoreline areas which received relatively high frequencies of simulated oilspill trajectories include the east bank of Shelikof Strait (land segments 13-18), the west bank of Shelikof Strait (land segments 44-49), Kamishak Bay (land segments 53-56), the Anchor Point area (land segments 74-75), and the Barren Islands and vicinity (land segments 79-82). Based on the relative scale of potential risk discussed earlier in this section (10% low, 11-20% moderate, and greater than 20% high potential impact), these major geographic areas are the most vulnerable with respect to oilspills hitting specific land segments within these areas. The land segments that are highest in potential risk to impact by an oilspill (using the 3-day trajectories) include the Kupreanof Strait area, with a probability of 17 percent (segment 15) on the east bank of Shelikof Strait, and from Kukak Bay to Kuliak Bay, with a probability of 23 percent (segment 45) on the west bank of Shelikof Strait. When considering the potential impact of the proposal, Kamishak Bay, Anchor Point, and the Barren Islands are low risk areas, but become high risk areas when potential cumulative impacts are considered.

If it is hypothesized that the maximum acceptable risk to any of the land segments were not to exceed a low potential impact of 10 percent, the proposal could be modified to stay within this constraint. The resulting modified proposal could be expected to produce about 430 MMbbls of oil. All of the blocks included in the proposal could be leased except for 40 percent of the T1 area and 100 percent of the P1 area (fig. IV.A.1.d.-19). These deletions would reduce the potential risk to land segments 15 and 45. The 40 percent block deletion is allocated to the eastern and western boundaries of the T1 area, since these tracts represent the greatest risk to the proposal in this area. However, the greatest reduction of risk is derived from the deletion of blocks in the P1 area.

If the hypothesized acceptable environmental risk were increased to a uniform limit of 20 percent, which is the upper moderate level of potential impact, the proposal would be limited primarily by the vulnerability of Kukak and Kuliak Bays (segment 45). Modifying the proposal to keep within a 20 percent potential risk level would mean that approximately 610 MMbbls of oil would be produced over the life of the field. The entire proposed sale area could be leased except for 60 percent of area P1 (fig. IV.A.1.d.-20). Deletion of 60 percent of area P1 could keep the Kukak Bay and Kuliak Bay areas (segment 45) within a moderate level of potential impact. When considering the current and circulation patterns in this area, the westernmost tracts of area P1 face the greatest risk of contact by an oilspill. The 60 percent block deletion, consequently, is allocated in this part of area P1.

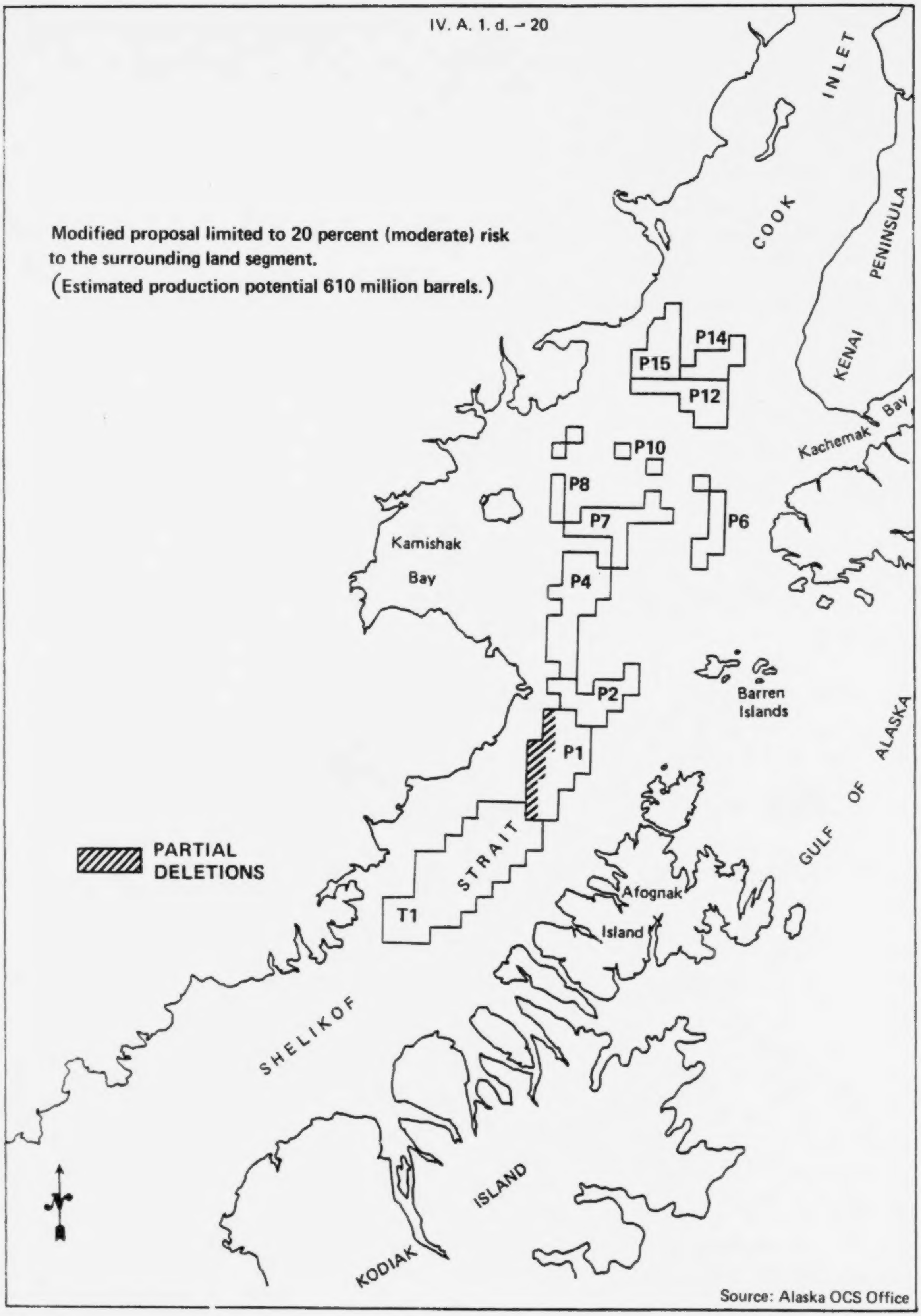


Modified proposal limited to a 10 percent (low) risk to the surrounding land segments.

(Estimated production potential 430 million barrels)

COOK INLET
KENAI PENINSULA
P14
P15
P12
Kachemak Bay
P10
P8
P7
P6
Kamishak Bay
P4
P2
Barren Islands
P1
GULF OF ALASKA
DELETED
PARTIAL DELETIONS
STRAIT
T1
Afognak Island
SHELIKOF
KODIAK ISLAND

Source: Alaska OCS Office


COOK INLET
KENAI PENINSULA
Kachemak Bay
P15
P14
P12
P10
P8
P7
P6
P4
P2
P1
T1
Kamishak Bay
Barren Islands
GULF OF ALASKA
Afognak Island
SHELIKOF STRAIT
KODIAK ISLAND
▨ PARTIAL DELETIONS

Modified proposal limited to 20 percent (moderate) risk to the surrounding land segment.
(Estimated production potential 610 million barrels.)

Source: Alaska OCS Office

In both the 10 and 20 percent maximum potential risk cases the proposal is limited primarily by land segment 45. Additional considerations, such as the high biological resources within this area and the relatively high persistence potential of an oilspill, suggest a conservative 10 percent constraint may be more appropriate level of risk. However, should adequate contingency measures be developed for this area, the element of risk could be significantly reduced.

With respect to cumulative impacts, the present tankering activity from upper Cook Inlet and the expected production from lower Cook Inlet (OCS sale CI), many areas already face high potential risk from oilspills. These areas include Kamishak Bay (land segments 54 and 56) and Anchor Point (land segment 75). Assuming adequate cleanup and contingency measures are in place for these more vulnerable areas, the level of acceptable risk could be increased.

In this portion of the analysis, the limits to segments 45, 54, and 56 were increased to 25 percent. The high vulnerability of the Anchor Point area (segment 75), with respect to cumulative impact potential, was given a limit of 30 percent. Acceptable risk of all of the remaining land segments for the entire area was limited to a maximum potential risk of 10 percent. Under these constraints, the proposal could be modified to yield 530 MMbbls of oil. The potential level of production would be achieved by leasing all of the blocks in sections P1, P2, and P14; 80 percent of the blocks in sections T1 and P15; and 90 percent of the tracts in area P4 (fig. IV.A.1.d.1.-21). In this case, deletions are those that would reduce potential impact to the lower Cook Inlet. The blocks in P6, P7, P8, P10, and P12; 20 percent of the blocks in P15 and T1; and 10 percent of the blocks in P4 present the greatest risk. The impacts associated with this modification of the proposal are addressed primarily in the cumulative impact sections concerning alternative VI (sec. IV.A.7).

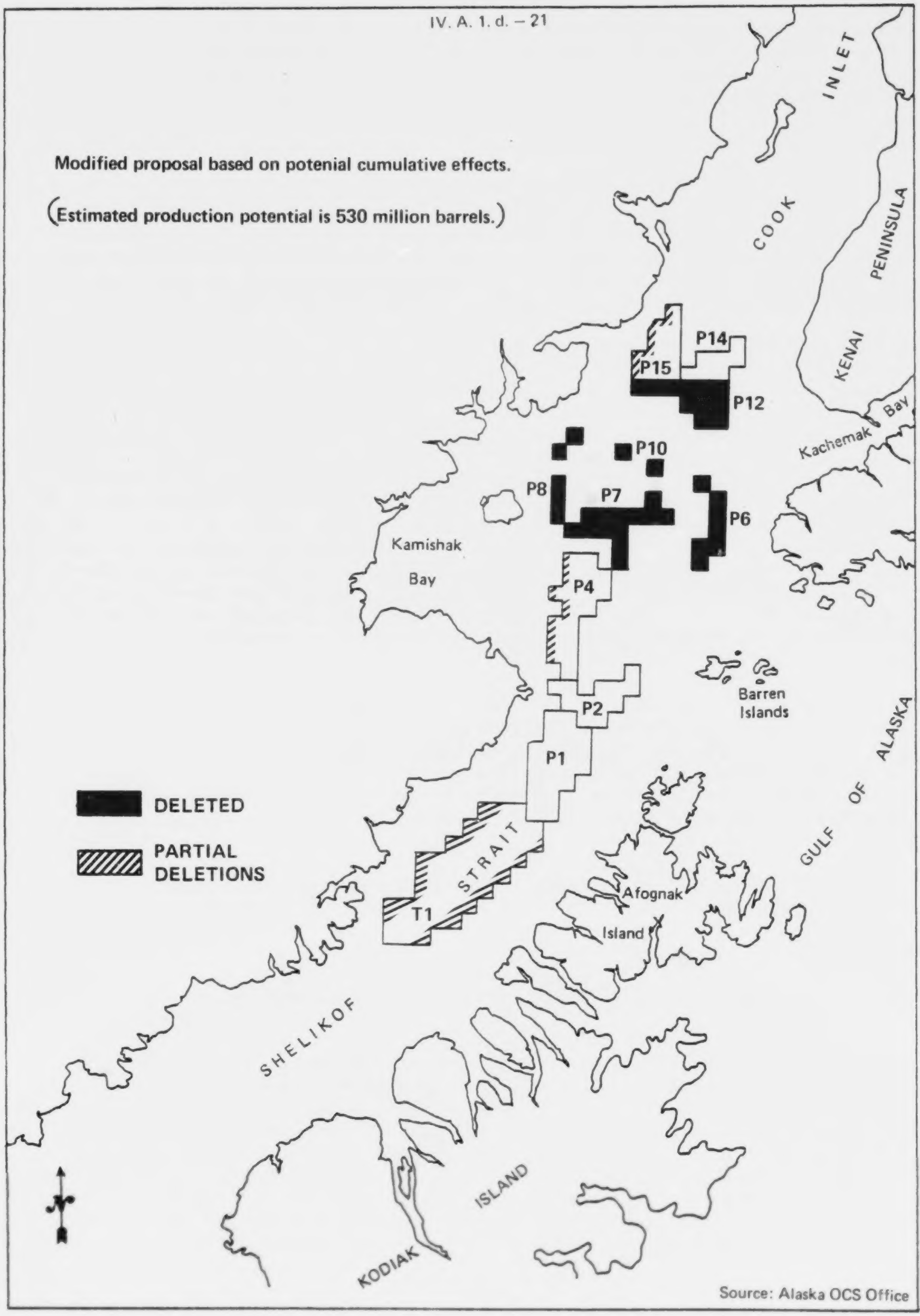
In conclusion, if the estimated oil resources from the existing leases in lower Cook Inlet are realized, the proposal could be modified as shown in figure IV.A.1.d.-21. In the absence of significant discoveries of oil from the existing leases and with adequate available contingency measures, the modified proposal as shown in figures IV.A.1.d.-19 and -20 may be more environmentally acceptable within the framework of the analysis done in this section (IV.A.1.d.).

e. Coastal Oilspill Persistence Index: This section describes the persistence of oilspills on coastlines. Coastlines essentially surround the proposed lease area, so are especially vulnerable to accidental oilspills, as described in the previous section (IV.A.1.d.).

The effect of oilspills that impact the coastline has been described by Hayes and Ruby (1979).

> There is abundant literature with case studies of the numerous major and minor oilspills that have taken place in the coastal waters of the contiguous United States and around the world. Predictive models for oilspill dispersal, spreading, bio-degradation, and physical degradation have been developed from these studies. The *Arrow* oilspill in Chedabucto Bay, Nova Scotia, probably comes closest to a comparative model for the sub-Arctic. However, the cleanup effort and later studies made very little reference to the special problems encountered as a result of the colder environment (i.e.,

IV. A. 1. d. – 21



Modified proposal based on potenial cumulative effects.

(Estimated production potential is 530 million barrels.)

COOK
INLET
KENAI
PENINSULA
Kachemak Bay
P14
P15
P12
P10
P8
P7
P6
Kamishak
Bay
P4
P2
P1
Barren
Islands
GULF OF ALASKA
DELETED
PARTIAL
DELETIONS
STRAIT
T1
Afognak
Island
SHELIKOF
KODIAK
ISLAND

Source: Alaska OCS Office

> oil on ice and snow; ice-oil interaction with beach sediments; oil dispersal in heavily iced environments, etc.). Studies of the Arrow spill strongly support the concept that physical degradation of spilled oil is directly related to the marine energy in the spill environment. Rashid (1974) gives strong supportive quantitative data in this regard. Further, evaporation losses and biodegradation are slower in colder environments. Biodegradation can be reduced as much as 90 percent in water of 0° C when compared to water of 25° C. Burning may be the only feasible method of cleaning oilspills in iced areas; however, this may represent a trade of one type of pollution for another. During the Buzzards Bay spill clean-up, burning was an effective method for cleaning oil which was not accessible from the shore. Only a small amount of particulate matter resulting from the fires was noticed.
>
> Finally, intense tidal currents and winds in the study area can disperse the spilled oil in an unpredictable manner, making it nearly impossible to recover before it impacts on nearby shorelines. It may not be feasible to recover or disperse oil slicks in regions of high tidal currents."

In Cook Inlet with its intense tidal currents, flushing is estimated to be 90 percent complete in 10 months (Kinney, et al., 1969). The same study concluded that microbiology degradation is much more important than tidal flushing in removing spilled oil from Cook Inlet.

Several indexes have been developed to estimate the persistence of oilspills on the coastlines. The Alaska Department of Fish and Game has developed a very good index (Map D in Alaska Department of Fish and Game, 1979). The Alaska Department of Fish and Game index is not described extensively in this section because only part of the area is indexed (only lower Cook Inlet). Also, the Alaska Department of Fish and Game index includes other factors than coastal vulnerability, such as oilspill trajectories and probabilities of areas being impacted by an oilspill. (For this EIS, oilspill trajectories have been extensively modeled by Dames and Moore (1980) and USGS (1980).)

Another index of the persistence of oilspills on coastlines has been developed by Michel, et al. (1978), and Hayes, et al. The results of this study are also described in chapter 8 of the Lower Cook Inlet Interim Synthesis (Science Applications, Inc., 1979) and in Blackburn (1979). The coastline has been categorized into morphological and sedimentary types with similar oilspill vulnerability ratings. The most vulnerable sections of the coastline are paraphrased below.

> Stable shorelines and tide-dominated bayhead depositional systems: Stable mountainous shorelines are dominated by steep valley walls, pocket beaches of mixed sand and gravel and extensive tidal flats. Stable lowland and hilly shorelines are generally sediment starved and fronted by thin tidal flat deposits covering wide rock platforms. Extensive sand waves and shoals, mud flats, and salt marshes are found in the depositional zone at the head of tidally dominated bays. Almost all areas are subject to long-term oilspill damage, especially salt marsh areas and tidal flats; fewer problems at the

> mouth than at the head of the embayment. Lower parts of intertidal areas would be flushed by tidal currents; oil may not enter an area if fresh water run-off is high.

Hayes, et al., estimate that spilled oil will persist on these parts of the coastline for 10 years or longer. Similar to the long-term persistence of oil in a toxic condition after it became buried in marsh sediments near the Buzzards Bay oilspill (Blumer, et al, 1970). (This estimate of persistence is very important for later assessments of the time period over which recreational, commercial, and subsistence fisheries may have to be closed as a result of a spill.) The locations of these stable shorelines and/or tide-dominated bay-head depositional systems in lower Cook Inlet are shown in dark red on graphic 2.

Another type of vulnerable coastline is described below by Hayes, et al.

> Deltas of heavy sediment laden streams entering areas of low wave energy and deltas of smaller streams. Low wave energy conditions and coarse grain size would allow oil to remain for years; fresh water plume would probably keep oil off delta during periods of high run-off.

Hayes, et al., estimate that spilled oil would persist on these sections of the coastline for several years. The locations of these deltaic shorelines in lower Cook Inlet are shown in light red on graphic 2.

Along the Kodiak Island side of Shelikof Strait the coastline vulnerability has been described thoroughly by Hayes and Ruby (1979). The types of coastline which they consider most vulnerable to oilspills are protected estuarine salt marshes and tidal flats. The locations of protected estuarine salt marshes and/or tidal flats on the southeastern Shelikof Strait coastline are shown in dark red on graphic 2. Hayes and Ruby estimated, on the basis of past spills on similar coastlines, that spilled oil could persist in a toxic state in these localities for up to 10 years.

Another category of vulnerable coastline along the Kodiak Island side of Shelikof Strait includes sheltered, rocky headlands and gravel beaches. The locations of these areas along this side of the Shelikof Strait coastline are shown in light red on graphic 2. Hayes and Ruby estimated that spilled oil could persist in a toxic state in these localities for a year to as many as 8 years.

Figure (C.4.1.a.) of the Kodiak Interim Synthesis Report (Science Applications, Inc., 1979) shows the coastal sediment or substrate types in Shelikof Strait. Muddy sediment, in which spilled oil might become buried most easily and persist longest, is shown to occur only at the head of Wide Bay. Another study of the Alaska Peninsula side of Shelikof Strait, the Alaska Intertidal Survey Atlas (Sears and Zimmerman, 1977), is very useful for determining coastal morphology and sedimentation. Some sections of the coastline have characteristics similar to those which Hayes and Ruby (1979) describe above for very vulnerable coastlines; i.e., tidal flats and estuarine marshes with muddy sediments in enclosed bays and lagoons. The location of sections of the Alaska Peninsula coast of the Shelikof Strait with these characteristics (as portrayed by Sears and Zimmerman, 1977) are shown in dark red on graphic 2. Hayes and Ruby (1979) estimate that spilled oil could persist for up to 10 years on coastlines with similar characteristics.

A slightly less vulnerable type of coastline was also identified by Hayes and Ruby. This type is characterized by sheltered or protected rocky headlands, and/or flat gravel beaches. The locations of sections of the Alaska Peninsula coast of the Shelikof Strait with these characteristics (as portrayed by Sears and Zimmerman, 1977) are shown in light red on graphic 2. Hayes and Ruby estimate that spilled oil could persist from 1 year to as many as 8 years on coastlines with similar characteristics.

Hayes' oilspill persistence index has recently been prepared for the Alaska Peninsula coast of Shelikof Strait (Domeracki, et. al., 1980). Drafts of this index do not differ significantly from the persistence index described immediately above and shown on graphic 2.

The estimated persistence of spilled oil on coastline segments can be combined with the probability of the coastline segments being impacted by oilspills (sec. IV.A.1.d.) in order to determine the most vulnerable sections of the coastline. The relative vulnerability of the coastline segments will be further modified by the biological and socioeconomic resources of the coastlines, as described in section IV.A.2.

f. Oilspill Response: Federal response capabilities and responsibilities in the event of an oil pollution incident are prescribed by the National Oil and Hazardous Substances Pollution Contingency Plan, published in final revised form March 19, 1980, by the Council on Environmental Quality. Since Federal contingency planning in Alaska had been done in accordance with earlier National Plans, information used here from Alaska regional planning documents is subject to revision, which is presently underway. Wherever possible, changes expected to be made in regional contingency plans to reflect the new National Plan will be cited.

The National Plan provides the framework for a geograpnically integrated Federal response capability and encourages the participation of State and local governments in coordinated preparedness and action. The National Response Team serves as the model for regional response organizations, makes available special forces and equipment to regional organizations, and serves in an oversight capacity to evaluate and make recommendations for improving response capabilities nationally.

In Alaska, the entire coastal area is a geographic zone of responsibility covered by the Alaska Coastal Region Multi-Agency Oil and Hazardous Substances Pollution Contingency Plan. The Plan specifies responsibilities among Federal and State government agencies, and designates the primary responsibility for effecting a coordinated response to pollution incidents in the marine environment with the United States Coast Guard. In Alaska, as elsewhere in the nation, primary responsibilities for coastal and inland waters are divided between the Coast Guard and the Environmental Protection Agency (EPA), with the EPA assuming primary responsibility in those geographic areas upstream of tidal influence.

The Alaska Coastal Region Plan specifies governmental response to a pollution incident as primarily a function of the Regional Response Team (RRT), the On Scene Coordinator (OSC), and the Scientific Support Coordinator (SSC). The RRT is composed of Federal and State agency representatives and is chaired by the Chief, Marine Safety Division, 17th Coast Guard District, covering all of

Alaska. (The new National Plan, oriented toward integrating coastal and inland waters pollution contingency planning, places the chairmanship jointly with the Coast Guard and the EPA.) The RRT is responsible for planning and preparedness actions prior to a pollution discharge and for coordination and advice during a pollution emergency. In addition to the Coast Guard, members of the Alaska Coastal RRT are designated representatives from the State of Alaska, the EPA, the Federal Emergency Management Agency and the following Federal departments: Agriculture, Commerce, Defense, Energy, Health and Human Services, Interior, Justice, Labor and State. The previous National and Regional Plans had differentiated between primary and advisory members. All representatives now have equal status, as would representatives of local governments designated to participate in the activities of the RRT. And, as at the national level, the Coast Guard additionally maintains and operates the Regional Response Center, in Alaska at the District Headquarters in Juneau.

Alaska coastal waters are divided into geographic zones of responsibility for which an On Scene Coordinator (OSC) is predesignated by the Coast Guard. The designated OSC for the lease sale area is the Commanding Officer, Marine Safety Office, Anchorage. The function of the OSC is to develop and maintain a Federal local contingency plan for Federal response in the area of the OSC's responsibility; and, at the scene of a discharge, to serve as the single point of contact for advising the spiller on cleanup measures or, if necessary, to coordinate and direct the Federal response and expedite pollutant removal efforts. The OSC provides information to and receives advice from the RRT during a spill emergency. The Scientific Support Coordinator (SSC), provided by the National Oceanic and Atmospheric Administration (NOAA) of the Department of Commerce, is on the staff of the OSC at the scene of a spill to provide scientific advice and mediate advice from the scientific community on the scene.

To assist the RRT, OSC, and SSC in performing their duties, there are national special forces on call, such as the Pacific Strike Team of the Coast Guard and the Environmental Response Team established by the EPA; a computerized national inventory of pollution response and support equipment for locating specialized equipment tailored to the characteristics of the spill; memoranda of agreement and interagency agreements to explicitly define areas of responsibility in cases where ambiguity among agency responsibility may exist; and specialized funtional groups within the RRT to provide expertise and leadership in areas such as public information, pollution control techniques, damage assessment, and protection of different types of living marine resources.

Petroleum Industry Oilspill Response Organizations: There are two petroleum industry oilspill response organizations operating in the proposed lease sale area, the Cook Inlet Response Organization (CIRO) and the Gulf of Alaska Cleanup Organization (GOACO). These response organizations are made up of a number of petroleum industry companies and operate through voluntary private industry agreement to jointly acquire oilspill containment and cleanup equipment, train personnel in its deployment and use, and provide a pooled capability of response greater than any individual company could provide alone.

GOACO was formed in 1975 in preparation for exploratory drilling in the OCS lease sale area 39 in the Gulf of Alaska. Composed of five member companies, GOACO maintains an inventory of equipment originally costing in excess of one million dollars. The organization has a manager housed in Anchorage, with equipment and materials based in Anchorage, Yakutat, and Kenai. CIRO was formed in 1978 as a joint venture of 13 petroleum companies operating in the Cook Inlet area. Equipment, originally costing approximately $1.3 million, is maintained in Anchorage, Kenai, Nikiski, and Homer. A manager is housed in adjacent offices with GOACO for coordination purposes. Much of the GOACO equipment currently is under the temporary control of CIRO due to the lack of offshore drilling activity in the Gulf of Alaska. CIRO currently is organizing the Cook Inlet Response Team to provide rapid initial response and follow up to an oilspill in CIRO's area of interest. Equipment and materials owned or under the control of CIRO and GOACO are listed in appendix E.

Petroleum Industry Oilspill Contingency Planning: Each of the petroleum industry oilspill response organizations in the proposed lease sale area has produced and continues to maintain an oilspill contingency plan, which essentially is a compilation of information needed by on-site response personnel. Such information generally includes inventories and operating characteristics of equipment resources; lists of supplies and purveyors of containment and cleanup services and supplies; procedures for containment, cleanup and disposal; the names and phone numbers of specific individuals in key government and business organizations; and organizational policy and operating agreements with other firms.

Additionally, the industry response organizations in the proposed lease sale area belong to the Alaska Cooperative Oilspill Response Planning Committee (ACORP), an informal organization formed in 1977 among the Alaska Department of Environmental Conservation, the United States Coast Guard, and the petroleum industry in Alaska. The ACORP Pollution Response Plan is intended to provide the means to coordinate Federal, State and petroleum industry resources in response to a significant oil pollution incident in coastal waters of Alaska. The plan provides for the sharing of resources, including equipment and technical expertise, among public and private spill response organizations and specifies procedural and fiscal terms and conditions for such sharing. Besides facilitating cooperative oilspill response, the plan allows the spiller (the responsible party in a spill incident) to gain access to State, Federal and industry oilspill and logistic equipment, technology, and manpower.

Oilspill Preparedness by OCS Lessees: The revised Outer Continental Shelf orders governing oil and gas lease operations (FR 12/21/79) specify requirements of OCS lessees for oilspill preparedness. OCS Order No. 2 (drilling operations) requires the lessee to submit with the Exploration Plan or Development and Production Plan evidence to the Deputy Conservation Manager (DCM) (of the USGS) of the fitness of the drilling unit to perform the planned drilling operation, such evidence to include information on pollution prevention equipment associated with the drilling operation. Based on past experience, minimum equipment and supplies for initial containment are based at the drilling site, usually including an inflatable containment boom, a mechanical oil skimming device, a storage container for recovered oil, sorbent pads, surface collecting and dispersant chemicals and chemical applicators. (See the June, 1979 revised oilspill contingency plan for exploratory drilling in OCS lease area CI, listing equipment aboard the Atlantic Richfield Company vessel Ocean Bounty. Also see the GOACO Oilspill Cleanup Manual of March, 1977, listing onboard equipment for drilling vessels SEDCO 706, Ocean Ranger, and Alaska Star.) The operational capabilities of the containment booms generally (based on manufacture type) are to function in waves up to 5 to 6 feet and in winds of up to 20 to 25 knots. Oil skimming equipment of the type generally on board operates in waves up to 2 to 3 feet in height, whereas sorbent booms and pads are used only with contained spills.

OCS Order No. 7 prescribes measures required of each lessee for pollution prevention and control. Included are requirements for inspections and reports, pollution-control equipment and materials, oilspill contingency plans and annual drills and training of personnel. Oilspill contingency plans are required of each lessee, submitted for approval to the DCM with or prior to submitting an Exploration Plan or a Development and Production Plan. Required in the contingency plans is information on response equipment and deployment times, response capability for varying spill severity, the means for identifying and protecting areas of special biological sensitivity, procedures for notifying key personnel, and provisions for response action at the scene of a spill. Pollution control equipment and materials are required to be maintained by, or available to, each lessee at an offshore location or at a location approved by the DCM. Such equipment and materials are required to be available prior to the commencement of drilling and production operations. For example, in the case of OCS sale 39 exploratory drilling off Yakutat, pollution control equipment and materials were in place in Yakutat and Seward as well as on the drilling vessel itself.

Cleanup Policies and Techniques: According to the Alaska Coastal Region Plan, the primary consideration in any spill response is the protection of life and property, followed by protection of the natural environment. (Endangered and threatened species identified by Federal law are also specifically addressed in the new National Plan.) Action to protect critical areas and remove pollutants therefrom takes priority where total removal of the pollutant from the environment is not possible.

Mechanical methods and sorbents are preferred in Alaskan waters for control of the source of discharge as well as the containment and removal of the pollutant. The use of chemical agents is governed by the National Plan and the circumstances of the spill. Generally, approval for use of chemical agents must be obtained from the senior EPA representative on scene at the spill on a case-by-case basis, after consultation with other appropriate State and Federal representatives. Exceptions to this general rule are for the use of surface collecting agents in accordance with the National Plan listing of approved chemicals where the use of chemicals will reduce the immediate hazards to human life due to explosion and/or fire.

Oilspill Incident Response: The Federal Water Pollution Control Act requires that all harmful discharges of oil and all discharges of hazardous substances into the navigable waters of the United States must be reported immediately to the appropriate Federal authority. The designated "authority" in Alaskan coastal waters is the United States Coast Guard. The Coast Guard can be contacted in the following ways:

1. Calling the toll-free number ZENITH 5555.
2. Calling the designated OSC for the area in question. In the case of the lease sale area, the OSC is Captain R. H. Spoltman, 907-271-5137.
3. Calling any Coast Guard unit in the vicinity of the incident.
4. Calling the Commander, 17th Coast Guard District in Juneau, 907-586-7195.

The OSC has the responsibility to respond to all reports of spill incidents. Oilspills in coastal waters are classified according to the National Contingency Plan by the amount or potential amount of discharge, as follows:

Minor discharge: less than 10,000 gallons
Medium discharge: 10,000 to 100,000 gallons
Major discharge: more than 100,000 gallons

The report of the existence or potential of a major spill, even an unconfirmed report, requires the OSC to immediately notify the National and Regional Response Centers. A minor spill normally will not require the OSC to alert the full membership of the RRT, but the decision to do so is based on the judgment of the OSC after investigating the spill report. Alerting the membership of the RRT usually is carried out by telephone conference call and normally is cause for activating the full or partial membership of the team to the scene of discharge.

Federal policy strongly encourages those responsible for a spill take appropriate abatement and cleanup actions voluntarily. When the responsible spiller takes appropriate actions, the OSC will observe and monitor progress and provide advice and counsel to the spiller. Federal cleanup activities are instituted when 1) the spiller is unknown or 2) in the judgment of the OSC, the spiller does not act promptly, does not take an interest to take appropriate cleanup action, or is unable to take adequate cleanup measures.

If an alleged spiller can be identified and cleanup is required, the OSC must immediately give written notification to the owner, operator or appropriate responsible party of Federal interest, his liability for cleanup, and other aspects of the Federal Water Pollution Control Act or National Contingency Plan as appropriate. If the alleged spiller fails to initiate cleanup activities, or initiates improper or inadequate cleanup actions, the OSC must advise the spiller in writing that his actions are considered inadequate and that he is liable for cleanup costs incurred in the event of a Federal cleanup. Such notice failing, the spill incident becomes a Federal responsibility.

g. Constraints on Oil and Gas Development: Potential geologic, oceanographic, and meteorologic hazards could restrict site selections for onshore or offshore facilities, and limit development of special engineering designs of facilities and operational precautions to meet the environmental conditions according to OCS Order No. 8 (appendix C).

The following describes the more significant potential natural hazards that could affect OCS development. Less significant potential oceanographic hazards such as sea ice, low or freezing air temperatures, and winds were considered during the environmental analysis but found not to be significant enough to require detailed treatment here.

Seismicity and Earthquake Associated Hazards: The environmental geology graphic (graphic 1) describes several aspects of large magnitude earthquakes and their effects on areas adjacent to the proposed lease area. According to a report by Thenhaus, et al. (1980), the proposed lease area occurs in a zone where the ground acceleration ranges from 40 to 60 percent of gravitational acceleration for those earthquakes with a 500-year return period. Estimates of great earthquake recurrence intervals range from a minimum of 33 years to a maximum of 800 years (Plafter, 1971).

The most significant constraint earthquakes pose to potential OCS development is the design of onshore and offshore facilities. These facilities should be designed to safely withstand large magnitude (greater than 6.5) earthquakes. Both onshore and offshore bottom-founded oil and gas facilities should also withstand ground accelerations predicted by Thenhaus, et al. (1980). In lower Cook Inlet and upper Shelikof Strait, ground shaking could be quite severe and platforms would have to adequately withstand it. If an offshore production platform fails or a pipeline ruptures due to seismically induced slumping or foundation failure, an oilspill could occur. However, potential slump areas in lower Cook Inlet and northern Shelikof Strait have not been found (Bouma and Hampton, 1979).

In the event of structural failure of an offshore production and storage facility, the lives of personnel onboard would be endangered. Severe financial losses could occur. Oilspills could occur depending on the nature of damage to pipes, wellhead facilities, feeder pipelines, and storage facilities. See section IV.A.1.d. for probabilities of oilspills.

Industry has attempted to design earthquake-proof platforms, one of which Exxon recently installed in the Santa Barbara Channel. The platform is a 290-meter production platform designed to withstand 500 cm^2/sec horizontal ground accelerations.

Production wells are required to have subsea safety valves which will shut off flow from the wells in the event of an earthquake.

Mass Movement: During some earthquakes, fine, well-sorted sandy or silty soils, especially water-saturated soils, could liquefy, lose bearing strength, and tend to slide or slump downslope. Landslides or mudflows could occur and threaten onshore facilities located in the area. The apparent stability of the sand wave field in lower Cook Inlet suggests that this large mass of sand has not been affected or significantly moved due to earthquakes in lower Cook Inlet.

Tsunamis: Both local and regional tsunamis can be generated by earthquake-induced submarine mass movements or tilting of the sea floor. Such tsunamis have the potential to severely threaten the physical existence of coastal communities and OCS development facilities, especially at elevations less than 30 meters above sea level. Tsunamis would probably not cause damage to offshore structures because their physical movement in deep water does not cause large waves.

The seismic sea wave warning system was established in 1948 by the U.S. Coast and Geodetic Survey. Advance notices of tsunamis are issued throughout Pacific coastal areas. Improved earthquake and tsunami warning systems have been installed in Alaska since 1964 to provide better and faster warnings to threatened coastal areas. Historically, Port Graham and English Bay coastal areas were severely impacted by a cross-inlet tsunami generated by volcanic activity on Augustine Island.

Tsunamis generated by a mudflow or large slump near Augustine Island could affect some coastal areas such as Port Graham and English Bay. Tsunamis can potentially rupture oil storage tanks, as well as overturn or severely damage oil tankers in ports.

In coastal areas, the best protection for onshore facilities is a careful site selection and design procedure with all due consideration being given to the potential occurrence of tsunamis.

Faulting: Faults pose moderate hazards to offshore drilling in lower Cook Inlet and upper Shelikof Strait (see graphic 1). During earthquakes, active faults and their movement pose potential problems for sea floor completion facilities and pipelines. Pipelines could be ruptured if much displacement occurred along a fault crossing a pipeline route.

In addition, if high abnormal formation pressures exist at producing horizons, and a serious oil blowout occurs, then active shallow, near-surface faults could prove to be potential hazards for oil and gas to reach the sea floor outside the well casing. Such a situation would represent a worst case scenario for a blowout. However, blowouts occurring inside the well casing have a much better chance of being brought under control more rapidly.

Volcanoes: Volcanoes in the Aleutian-Alaska Peninsula and Cook Inlet areas are the result of weak areas in the convergence between the North American and Pacific plates. Nineteen volcanoes exist in this region, eight of which have erupted in the last 100 years. OCS operations and facilities located on or very close to Augustine Island in lower Cook Inlet would most likely be affected by potential hazards of the Augustine volcano. The proposed lease area in upper Shelikof Strait probably would be more affected by a significant eruption of Mt. Katmai than Augustine. The 1912 Katmai eruption was one of the world's largest in this century.

The major potential hazards of Augustine Island are glowing avalanches (pyroclastic flows), mudflows and floods, minor lava flows, bomb and ash falls, noxious fumes, poisonous gases and acid rains, and tsunamis. Of these, the most serious hazard to offshore oil and gas development is the glowing avalanche. Ballistic studies indicate that the ejection range of large bombs is mainly restricted to the island itself.

The proposed lease area in lower Cook Inlet could be affected by bomb and ash falls, and possibly noxious fumes due to a hot glowing ash cloud moving up to perhaps 9.6 to 16 kilometers offshore of Augustine Island. Acid rainfalls over the lower Cook Inlet area could also occur. Ash from the past eruption spread over southern Alaska, as far north as Anchorage and Talkeetna, and as far east as Sitka, 1100 kilometers away. Ash dispersal is strongly dependent on the prevailing winds. No place on Augustine Island is safe to erect permanent or semi-permanent structures.

Protection from such atmospheric effects of a volcanic eruption on Augustine could be mitigated by adequate public notice of volcanic activities.

The 1883 eruption produced tsunamis that crossed the entire lower Cook Inlet. The tsunami warning system, the Palmer Seismic Observatory, the Geological Survey, and the University of Alaska scientists studying Augustine Volcano could provide OCS operators notice of any impending potential volcanic eruptions on Augustine.

Neither ash fall nor acid rainfalls have the potential to affect offshore production platforms, pipelines, tanker terminals, or vessel traffic to such an extent that a major oilspill would occur. However, personnel, air intake filters, and exposed mechanical equipment could be affected by either acid rainfalls or abrasive ash deposits.

An evaluation of potential geologic hazards in the lease sale area has been carried out by the USGS and is included in Appendix L. This evaluation, which substantiates the analysis performed here, concludes "that no tracts within the proposed sale area are sufficiently impacted by geologic hazards to prevent safe exploration and development for hydrocarbons."

Conclusion: Table IV.A.1.g.-1 summarizes physical constraints which could affect various types of oil and gas operations in the proposed lease area.

Most potential geologic hazards in either lower Cook Inlet or Shelikof Strait can be mitigated by adequate compliance with OCS Operating Orders and appropriate facility design.

OCS Operating Order No. 8 mitigates most potential hazards by requiring that offshore facilities design complies with Geological Survey standards.

Faults per se would not affect offshore structures because of mitigation by design and OCS operating orders. Large magnitude earthquakes and ground shaking could damage OCS-related onshore facilities, especially oil storage tanks, but not offshore structures, because of mitigation by engineering design and compliance with OCS operating orders. Ash falls and acid rainfalls due to volcanic eruptions could adversely affect OCS personnel and equipment both onshore and offshore. The coastal effects of a seismically or volcanic-induced tsunami could be devastating, but appropriate consideration of tsunami potential during actual onshore facility siting and design would considerably reduce the risk to human life by tsunamis. Offshore structures, however, would not be affected by tsunamis.

The large sand wave field in lower Cook Inlet appears to have been relatively stable over a 5-year period of time. In view of this, the potential risk to seabed pipelines crossing the sand field could be considerably reduced. Selective pipeline routing in and around the sand field could also minimize the potential hazard of the sand field to seabed pipelines.

Cumulative Effects: The cumulative effect of potentially recurring earthquakes close to oil and gas facilities in lower Cook Inlet or upper Shelikof Strait could result in repeated occurrences of severe damage to such facilities. Repetitious, severe earthquakes over the life of the project could result in significant losses to physical facilities, human resources, and the local lifestyle and economy. However, given appropriate facility design and compliance with local, State, and Federal regulations such occurrences would be considered unlikely. Offshore facilities would not be affected because of their engineering design and compliance with OCS operating orders.

Unavoidable Adverse Effects: There would be no unavoidable adverse effects to offshore structures because of earthquakes, faulting or tsunamis, because each of these physical environmental constraints can and would be designed in compliance with petroleum industry standards and OCS operating orders.

Table IV.A.1.g.-1
Sale 60 - Lower Cook Inlet/Shelikof Strait
Estimated Physical Constraints on Oil and Gas Development

ENVIRONMENTAL FACTORS	ONSHORE DEVELOPMENT					OFFSHORE DEVELOPMENT			OFFSHORE EXPLORATION		
	Gas Pipeline	LNG Plant	Support and Supply Base	Oil Terminal	Pipelines	Submarine Pipelines	Production Platforms	Bottom-founded Platforms	Jack-ups	Drillships	Semi-Submersibles
Earthquake Magnitude	H	H	H	H	H	H	H		H	L	L
Ground Shaking or Breaking	H	H	M	H	H	H	H		H	L	L
Mass Movement (slumping, landslides, mudflows, liquefaction of soils, and avalanches)	H	H	M	H	H	H	H		H	L	L
Faulting	M	L	L	L	M	M	L		L	L	L
Gas-Charged Sediments	L	L	L	L	L	L	M		M	M	M
Tsunamis	L	H	H	H	L	L	L		L	L	L
Storm Waves	L	L	L	L	L	L	M		M	L	L
Sediment Transport and Seabed Bedforms	L	L	L	L	L	M-H	M		M	L	L
High Abnormal Formation Pressures	L	L	L	L	L	L	M-H		M-H	M-H	M-H
Coastal Erosion	L	L	M	L	M	M	L		L	L	L

Note: The H (high), M (medium), and L (low) designations are based on a combined assessment of (1) the severity of potential environmental hazards to oil and gas operations, (2) the availability of technical information necessary to either develop or implement appropriate offshore technological systems, and (3) the extent of the relative availability of present and future technology in response to potential natural hazards.

h. Other Major Projects Considered in Analyzing Cumulative Effects: This section contains a brief description of major projects which may occur, in the near future, within or close to the proposed sale area. Ongoing projects are not considered in this section, since they are considered as part of the baseline environment. The projects listed in this section have been considered in the cumulative effects sections of this document. The listing is not comprehensive. Other specific projects which are not major or which occur at some distance from the proposed sale area but which are felt to be germane to a discussion of a particular topic, are incorporated within the pertinent cumulative effects section.

Beluga Coal Field: The Placer Amex Company is currently planning to mine the Beluga Coal Fields on the west side of Cook Inlet. The coal will be strip mined for export or will be used to satisfy local energy needs. According to the Placer Amex's development scenarios, coal mining and exporting activities would begin in 1990 or 1991. A community of 1,300 residents could develop near the field.

The produced coal would be either shipped in bulk form as methanol, or as coal slurry. Although it is unknown exactly where the shipping terminal for the Beluga field would be located, it is proposed that the methanol option would utilize the Drift River-Granite Point oil pipeline and would load traffic at the Drift River facility. To be economically viable the field would have to annually yield 6×10^6 tons of coal for shipment. If converted into slurry, it would take approximately 60 tankers per year of the 100,000 DWT cargo category to move the product.

Bradley Lake Hydroelectric Project: Bradley Lake occupies an ice scoured basin in the Kenai Mountains, some 36 air miles northeast of Homer. The Corps of Engineers proposes to construct a concrete gravity dam at the point where Bradley Lake flows into Bradley River. The dam will be capable of generating 70 megawatts of power with a future maximum capacity of 118 megawatts. The Bradley Lake dam was originally expected to be constructed in the mid-60's; however, the discovery of oil and gas in the Cook Inlet deprived the proposed dam of its energy market area and postponed its construction. Presently, the earliest funding approval possible will allow Bradley Lake construction to begin in 1983.

Materials and equipment needed to construct the dam could be brought on site by two methods. First, a road could be constructed from Homer to Bradley Lake. A second idea under consideration would result in the barging of all materials to a dock facility located at Bear Cove whereupon they would be transported overland to the dam site. The site of the construction base camp for the dam is unknown but could possibly be Homer.

Pacific LNG Plant: In spring of 1982, construction should begin on a natural gas liquefication plant located at Nikiski, Alaska. The plant, operated by the Pacific-Alaska LNG Company, is projected to have a peak liquefication capacity of 400 million cubic feet per day, and will require about 59 acres of land. The facility will be located on borough owned lands, and will be part of an existing industrial park which contains the Tesoro refinery, the Standard refinery, the Chugach Electric power company, the Phillips LNG plant, and the Colliers Ammonia and Urea facility. Erection of the Pacific LNG plant will require the addition of one loading dock, and will generate between 50 to 60 loads of LNG per year. The LNG tanker size employed will probably be of the 130,000 cubic meter class.

Peak employment during the construction phase of the Pacific plant would require some 1,200 workers. Annual employment during the production phase of the plant's life would be 65-75 people. Total life of the plant is projected to be between 20 and 40 years.

Homer Harbor and Fisheries Industry Expansion: The city and port of Homer have been targeted by a number of organizations for various types of harbor expansion and bottomfish industry development schemes. Of the various proposals, three have advanced to the point of actual construction or near construction.

First, the Homer Fisheries Industrial Park, operated by Douglas Sweat, would provide industrial fisheries lots for the siting of marine oriented private industries, such as fish and shellfish processors, tug and barge operations, marine repair firms, and marine service companies. The Homer Fisheries Industrial Park would occupy 65 acres each. At peak operation the project would employ 130 people. The Homer Industrial Park has obtained construction approval from the Corps of Engineers; however, adequate private funding has not been forthcoming.

Second, the World Seafood Corporation is currently constructing a large bottomfish processing facility on the Homer Spit, north of the small boat harbor. The facility will be able to process 1,800 metric tons of fish per hour. The facility should require 30 people to build it and 40 to operate the facility year round.

Third, the city of Homer is proposing the expansion of its existing small boat harbor, and the construction of a new 1,400-foot dock. The new dock would reach into Kachemak Bay, and would provide Homer with the capacity to service deep draft vessels. Total costs of the projects would be about 20 million dollars. The new dock and expanded small boat harbor would be designed to serve many interests, including development of existing commercial fisheries, development of a bottomfishing industry, and OCS related development. Approval of the project is pending; it should be constructed in the early 1980's.

Kodiak Small Boat Harbor: The Corps of Engineers has proposed to build a second small boat harbor in the vicinity of Kodiak city. This proposed harbor has been funded by Congress, and work will probably begin on the project in the early 1980's.

Present harbor capacity (in Kodiak) leaves some 580 fishing vessels without protected mooring space. Dog Bay, the proposed small boat harbor site, is a 100-acre site located on the southwestern side of Near Island, across a narrow channel from the city of Kodiak. Within Dog Bay, an area of 45 acres fulfills the city's current 25-acre mooring space requirement, and leaves 20 acres for potential space growth.

Port Lions Small Boat Harbor: Currently awaiting congressional funding approval is the Corps of Engineers' proposed Small Boat Harbor at Port Lions on Kodiak Island. The proposed Corps project is located at Settlers Cove at Port

Lions. The purpose of the project is to provide safe anchorage for the local fleet of 52 commercial fishing boats, and a transient fleet in excess of 128 commercial fishing vessels. The harbor will also provide refuge for increasing numbers of sport fishing and recreational boats. The project will consist of two rock-fill breakwaters located across the mouth of Settlers Cove enclosing an area of 52 acres.

Proposed OCS Lease Sale 61: An evaluation of cumulative effects in regard to lease sale 61 is not included within this EIS. This topic has been the source of a number of comments resulting from the review of the DEIS. A thorough response to the issue of considering proposed OCS sale 61 in the cumulative effects of proposed sale 60 is contained in the response to comments (sec. V.D.1.). Essentially, sufficient information to make such an analysis is unavailable and the timing of OCS leasing processes is such that considerable time remains to affect future decisions on sale 60 in the series of subsequent decision points involved.

Lower Cook Inlet Sale: To date some seven dry holes have been drilled as a result of OCS sale CI. ARCO is scheduled to drill one more well in the fall of 1980. As of December 1980, 18 of 87 leases have been relinquished. Unless a significant oil and/or gas find is soon located within the boundaries of the sale area, industry activities will probably cease.

State of Alaska Sale 35: The State of Alaska proposes leasing lands offshore and onshore in lower Cook Inlet for oil and gas exploration during the first quarter of 1982, coordinated with proposed OCS sale 60 to be conducted in September of 1981. Results of the geological evaluation process are not available at this time. Offshore, the bulk of the proposed sale 35 area extends from Nikiski to the southern boundary of State waters within Cook Inlet and continues intermittently on the west side of Cook Inlet within the 3-mile limit of State waters to Oil Bay. This southern extension of the State's proposed lease sale area is situated west of the northern blocks considered for proposed lease sale 60 (generally from block 484 northward).

2. Alternative I - Proposal (153 blocks): The following sections assess the impacts of oil and gas leasing in the proposed sale area (see fig. II.B.1.a.-1).

a. Impacts on Vulnerable Coastal Habitats: A coastal habitat is defined here as a geographic area, bounded by the highest tide line shoreward and a 20-meter (65.6-ft) depth oceanward, within which many living organisms reside. Coastal habitats are especially vulnerable to oilspills which form oil slicks on the surface of the water. On some sections of the coastline, spilled oil may persist in a toxic condition for up to 10 years (sec. IV.A.1.e.). Another factor which makes coastal habitats especially vulnerable is that they are the main areas within which a wide variety of sensitive and valuable species reside. The probable impacts on some of these species are described in more detail in section IV.A.2.b. (razor clams and nearshore larval fish), IV.A.2.e. (sea otters and coastal marine mammal rookeries), and IV.A.3.h.(4) (intertidal organisms that are harvested as subsistence foods). These coastal organisms and habitats, which essentially surround the proposed lease area (as described in sec. III.B.1.), may be primarily impacted by oilspills, and only slightly impacted by discharges of drilling fluids and by disturbance during construction.

Oilspills: According to USGS oilspill statistics (sec.IV.A.1.d.), if the estimated amount of petroleum is discovered, four oilspills exceeding 1,000 barrels are most likely to occur. These major spills have a high (94%) likelihood of contacting the surrounding coastal habitats within 10 days (while the oil is fresh and still quite toxic). Spills of natural gas are not included in these calculations because of the rapid evaporation of gas and, thus, lack of impact.

Major oilspills due to blowouts on the U.S. outer continental shelf (more than 3 mi from land) have become relatively infrequent with recent improvements in technology (Danenberger, 1980, and table IV.A.1.d.). Oilspills from pipelines, which may occur close to shore, are typically small because the flow can be controlled.

In contrast, tanker spills are usually very large, are usually quite close to land, and are still a major source of oilspills (Ross, 1980). The impact of tanker spills on coastal habitats can be estimated with the amount of oil spilled during three past tanker accidents, and with the amount of coastline that was affected. A 1970 discharge of "hundreds of barrels" of oily ballast water from a tanker near Kodiak Island affected portions of its coastline for 150 kilometers (93.2 mi). The Metula tanker spill in the Straits of Magellan impacted 150 kilometers (93.2 mi) of rocky coastline with a large amount of crude oil. The Arrow tanker spill in Nova Scotia impacted a 25-kilometer (15.5-mi) stretch of deeply indented, rocky coastline with about 70,000 barrels of Bunker C fuel oil. The accidents indicate that a major tanker spill may affect a 25- to 150-kilometer (15.5-93.2 mi) stretch of rocky coastline. This distance equals one-sixth to one-half of Kodiak's westside coastline; i.e., a tanker spill may impact a very long segment of coastal habitat.

As will be discussed later in the paragraphs on "Cumulative Effects," it is important to understand that a definite risk already exists of tanker spills in Cook Inlet and near Kodiak Island. For example, spills associated with only the proposed lease sale have a 9 percent probability of contacting Augustine Island within 10 days, but spills associated also with the existing leases and the existing tanker traffic in lower Cook Inlet have a 49 percent probability of contacting the island (sec. IV.A.1.d.).

Oilspills that contact coastal habitats can have a very toxic affect on the biota. A previous environmental statement for the Kodiak area (DOI, p. 43, 1977) concluded about oilspills:

> "Maximum adverse impacts would occur on the upper and mid-intertidal zone, in areas of extensive semi-protected or protected heavily vegetated coastline. Inshore bays and estuaries having muddy and sandy bottoms and limited circulation patterns would also be severely impacted."

Infauna, such as razor clams, are one of the main organisms that might be affected by oilspills contacting the coastline. After the Amoco Cadiz tanker spill in France, many razor clams died. Razor clams in Shelikof Strait and lower Cook Inlet occur in large, commercial concentrations in several areas (see graphic 2). In northwestern Shelikof Strait near Swikshak, $100,000 worth of razor clams have been harvested annually by commercial fishermen. Oilspills resulting from the proposed lease sale have over a 40 percent likelihood of occurring and contacting at least one of the important razor clam beaches (see appendix D). Most of these beaches have an oilspill persistence rating (sec. IV.A.1.e) of less than 1 year, so the toxic effect of any spill on the razor clam population may persist for that length of time. Even if the razor clams are not killed, a spill may taint the clams and the area would likely be closed to clamming. After an oilspill in another area (Buzzards Bay, Massachusetts) all of the shellfish beds on the eastern shore of the bay were closed for one and a half years (Palmer, 1980). The effect of a closure would be most disruptive along the eastern part of lower Cook Inlet where a million razor clams are removed annually by sport fishermen (sec. III.B.2.d.). As indicated by the oilspill model, size of spills, and persistence index (secs. IV.A.1.d. & e.), there is an additional 9 percent chance that spills from the proposed lease area could affect a large portion of these razor clam beaches for 1 year during the life of the project. The impacts of oilspills on commercial harvests of razor clams are discussed further in section IV.A.2.b. and c.

Hydrocarbons dissolved in water below a fresh surface slick may kill or taint the scallops on the shallow water banks, but the toxic affect would probably not persist long because of the continual flushing action of the water on the shallow-water banks. Spills from the proposed lease area have a 7 percent chance of contacting within 3 days (while a slick is still fresh) the shallow-water banks on which scallops are harvested (shown on graphic 2; see also appendix D and sec. IV.A.1.d.).

The risk of oilspills to other coastal organisms, such as herring, which spawn on kelp in certain areas, is discussed in other sections (IV.A.2. biological sections). In addition to specific organisms, some entire bays are sensitive habitats and/or are used extensively for commercial and subsistence purposes. One of these bays is Kachemak Bay. Interestingly, the bay has a negligible chance of being impacted by additional spills from the proposed lease area (sec. IV.A.1.d.). Kamishak Bay has a much higher chance (29%) of being impacted by spills within 10 days of the accident. (As stated earlier, a risk which is actually twice as large is posed to Kamishak Bay by the existing tracts and tanker routes.) The deeply indented bays on the northwest side of Kodiak Island have a substantial, additional risk of being impacted. For example, Kupreanof Strait alone has an additional 23 percent probability of being impacted by additional spills. In these bays along the northwest coast of Kodiak Island, many coastal organisms are harvested as subsistence food (sec. III.C.1.d.). The subsistence foods include vulnerable infauna organisms, such as the razor clams, and slightly less vulnerable intertidal and subtidal organisms, such as sea urchins.

For the proposal, oil is hypothesized to be transported by pipe through Kupreanof Strait to Talnik Point, and by tanker through Marmot Bay. The oilspill risks posed by these activities are primarily associated with the development scenario (sec. IV.A.1.b.), i.e., with later decisions about whether and how to produce a field if one is discovered. Later decisions about pipeline routes may substantially change the risks. For example, a pipeline to the Shuyak Strait area rather than to Kupreanof Strait area displaces about one-third of the projected impact away from the Kupreanof Strait area.

Discharges: The toxic discharges that are associated with the proposed action include drilling muds and formation waters. Drilling muds are mainly inert clays, but contain some toxic components and trace amounts of hazardous heavy metals, as described at a recent symposium on the environmental rate of drilling fluids (Alaska Petroleum Institute, 1980). All of the components are rapidly diluted upon discharge in turbulent deep water, as in lower Cook Inlet (Dames and Moore, 1978):

> "The results indicate that, in most cases, within a few meters of the discharge point, drilling fluids were well below concentrations expected to cause mortalities in the most sensitive organism tested. For a short period (up to 3 hours) discharges during "cementing" of the well and at the end of the well resulted in calculated concentrations of drilling mud within a few meters of the discharge that exceeded levels found to be toxic in the 96-hour laboratory tests."

Since none of the drilling locations are, of course, within 3 miles of land where the water is shallower and less turbulent, toxic concentrations would not accumulate.

Formation waters may be discharged (if oil is discovered). Formation waters can be quite toxic to organisms, as observed around a drilling rig in a very shallow (2.5 m or 8.2 ft) bay (Armstrong, et al., 1979). Any platforms where formation waters might be discharged will, of course, be 3 miles from land. The minimum water depths in the proposed lease area are: in lower Cook Inlet, about 10 meters (32.8 ft) on the very turbulent bank just south of Kalgin Island; and in Shelikof Strait, about 20 meters (65.7 ft) along the northwestern shore. Because of the water depths and turbulence, there would be no toxic affect of formation waters on organisms.

Disturbance: Pipelines that cross the shoreline would cause some disturbance of coastal habitats. Two oil pipelines and one gas pipeline that cross the shoreline are hypothesized for the proposal. Burial of these pipelines would destroy a strip of benthos and intertidal organisms about 5 meters (16.4 ft) wide. If the pipeline routes cross densely populated habitats, such as kelp beds, the impact could be substantial. Coastal areas in lower Cook Inlet in which pipeline burial would be least disruptive have been identified by the Alaska Department of Fish and Game (1979). Utilization of this publication during post-lease routing of pipelines would result in greatly minimized impacts.

Conclusion: Discharges during the exploratory and/or production phases, and habitat disturbance during the development phase would probably cause no substantial impacts to vulnerable coastal habitats. In contrast, oilspills may cause occasional large-scale impacts. Four additional, major spills are most likely to occur as a result of the proposed leasing; these spills have a 94 percent chance of impacting the coastal habitats and infaunal organisms which almost entirely surround this particular OCS area. Oilspills that reach the coastal habitat would probably kill or temporarily taint for up to 1 year infaunal organisms, such as the razor clam, which are valuable for recreational, commercial, and subsistence purposes. The costs of oilspill impacts to the coastal habitats and infaunal organisms would not be costs which only the fishermen, the surrounding communities, and the State would necessarily assume because of the existing Offshore Oil Pollution Compensation Fund (appendix F).

Cumulative Effects: The oilspill risks to the coastal habitats that are summarized above are smaller than those existing because of OCS sale CI and oil tankering through lower Cook Inlet. According to U.S. Geological Survey oilspill statistics, when the proposed sale, sale CI, and existing tankering in lower Cook Inlet are considered, there is a 94-percent probability that one or more oilspills of 1,000 barrels or more would occur and contact a portion of the coastal habitat surrounding the proposed lease area. The most likely number of 1,000-barrel or greater spills projected to occur as a result of the proposed sale and existing oil-related activities in lower Cook Inlet is eleven compared to four for the proposal itself. This projected number of spills means that the coastal habitats could be subjected to continuous oilspill impacts. Thus, while the impacts on coastal habitats would be similar to those described in the conclusion (above), they could be more severe.

Unavoidable Adverse Effects: Oilspills are due to accidents, so oilspill impacts are not entirely avoidable. Oilspill response capabilities (sec. IV.A.1.f.) have been only partially successful with the reduction of impacts due to oilspills. Historically, a much lower percentage of transported oil has been spilled from pipelines than from tankers; .0017 percent of the oil transported by pipelines has been spilled as opposed to .016 percent from tankers (Council on Environmental Quality, 1974). Thus, much additional environmental protection to vulnerable coastal habitats in lower Cook Inlet and Shelikof Strait could probably be gained by using pipelines or a method of transportation that poses no greater oilspill risk (see sec. II.B.1.c., potential mitigating measure 2).

b. Impacts on Commercial and Sportfish: This topic has been identified during scoping as a major issue.

Impact of OCS Drilling Muds and Formation Water Disturbances: This subsection identifies the acute and chronic effects of OCS drilling fluids and formation water discharges upon important fisheries and benthic communities. The chronic effects discussion encompasses marine biota generally. Refer to section IV.A.2.o. for an evaluation of impacts of OCS discharges on water quality.

Acute Effects of Drilling Muds: In spite of the variability among experimental techniques, the majority of data indicate that both whole muds and mud components, with the exception of bacteriocides, are relatively nontoxic. LD50's for the whole muds fall in range of 3,000 to greater than 100,000 ppm (Ray, 1978; McAuliffe and Palmer, 1976). Available toxicity data indicate that adult cold water organisms are generally not more sensitive than temperate water ones.

Important Alaskan commercial species which have been subject to toxicity bioassays include coho, pink, and chum salmon (B.C. Research, 1976) and pink, hump, and coon striped shrimp (Dames and Moore, 1978). The salmonids showed an LD50 ranging from 4,000 to 190,000 ppm depending upon the drilling mud components tested. The shrimp species showed an LD50 in the range of 14,000 ppm. Other cold water species tested for LD50 in the lower Cook Inlet COST well study include amphipods (500+ ppm), mysids (1,600 ppm), isopods (2,000 ppm), and brine shrimp larvae (500 ppm) (Dames and Moore, 1978).

Larval stages of commercially important crustacea indigenous to Alaskan shelf waters have been subject to drilling mud toxicity studies. These include tanner, king and Dungeness crab, razor clams, scallops, and mussels (U.S. Department of Commerce, 1979). The acute toxicity levels of larval stages of crustacea can be at least an order of magnitude less (10^{-1}), if not lower, than adult stages of the same species.

Preliminary conclusions of Rice concerning some drilling mud toxicity tests conducted with crustacean larvae (king, tanner, and dungeness crab and coonstripe, dock, and kelp shrimp) are:

1. Crustacean larvae in our tests are more sensitive than reported LC50's for adult shrimp and fish.

2. Suspended muds were about 5 to 10 times more toxic than water soluble fractions of mud (WSF).

3. The length of time required for a toxic solution suspended mud or WSF to show adverse effects was noticeably longer than WSF's of oil.

4. Mud WSF are more stable (persist longer) in seawater than petroleum hydrocarbon WSF's.

5. Adverse effects to larvae appear to be caused primarily by physical aspects of the exposure rather than chemical toxicity.

6. The toxicity of drilling muds tested appears to be correlated with lignosulfonate content.

Bacteriocides within drilling fluids can be acutely toxic to tested biota. Specifically, halogenated phenols, quatenary amines, and diomine salts have LD50 values of less than 1.0 ppm. The aldehydes, for example formaldehyde, are generally less toxic with an LD50 between 50 and 400 ppm (Robichaux, 1975). The U.S. Geological Survey has issued a rule prohibiting use of halogenated phenols as a drilling fluid constituent (30 CFR 250.11, 250.43; 44 FR 39031). Abundant evidence indicates that lethal concentrations (greater than LD50) of the dissolved fraction of drilling fluid contaminants are only present within a few meters of the discharge pipe, and that the apparent effects of mud discharges are minor. The acute effects of the sedimentary fraction of drilling muds and cuttings upon benthic communities is restricted to a smothering pheonomena where the rate of deposition exceeds approximately 5 centimeters on the sea floor (Dames and Moore, 1978).

Acute Effects of Petroleum Hydrocarbons: Acute toxicity tests have been performed on a variety of salmonoids, shrimp, crab, bottomfish, mollusks, and finfish (Trasky, 1978; Malins, 1977; Caldwell, Caldarone, and Mallon in Wolfe 1977; Katz, 1973; Mc Auliffe, 1966; Anderson et. al. 1974). The tests have been performed on both warm and cold water environments with some tests having been performed on indigenous cold water species of Alaska. Standard 96-hour bioassay results on pink scallops were 0.8 ppm, on pink salmon fry 2.9 ppm, and on adult king crabs 4 ppm (Rice et. al. 1976). The most sensitive bioassay results were reported on Dungeness crab larvae at 0.04 ppm, with threshhold toxicity effects measured at 49 ppb (Caldwell, Calderone, and Mallon, 1977). The bioassays used water soluable fractions or crude oil mechanical solutions as the test substance (Cook Inlet crude oil).

Comparison of the above toxic concentrations of the water soluable fractions (WSF) of crude oil with known concentrations of dissolved petroleum hydrocarbons in produced water discharges is difficult. The difficulty turns on the definition of the WSF and the analytical testing procedure employed. The sum of the aromatic hydrocarbons tested in the Granite Point and Trading Bay production facilities constitutes most of the WSF set of toxic hydrocarbons identified by the National Marine Fisheries Service (NMFS) (Alaska Department of Environmental Conservation, 1978). The Marathon NPDEFS Permit Application for the Trading Bay facility tested for aromatic hydrocarbons according to the Alaska Department of Environmental Conservation and the NMFS analytical procedures which permit an estimation of total WSF and a comparison with toxicity study results. The total WSF concentrations from these facility discharges (2.6-6.7 ppm) are approximately 10^2-10^3 greater than the most sensitive toxicity test results (0.04 ppm for Dungeness crab larvae).

It can be conservatively estimated that lethal effects of treated produced waters discharged from platforms on finfish and benthic species would not extend beyond 100 meters from the discharge source based upon the dilution rates reported in the lower Cook Inlet rig monitoring studies.

Chronic Effects: At least three levels of effects upon marine biota can be postulated for suspected contaminants: 1) short term lethal effects, 2) sublethal physiological effects, and 3) behaviorial effects (Percy and Mullin, 1975; Trasky, 1977). There is a substantial dispute among investigators as to whether wastewater discharges from OCS operations pose chronic adverse effects through the stages of sublethal, physiological, and behaviorial effects.

Representatives of the oil and gas industry argue that sufficient research has been done to demonstrate findings of no chronic adverse effects from drilling fluid discharges upon pelagic communities (Ray, 1978; American Petroleum Institute, 1979). Various scientists and resource agency officials disagree and argue that the available evidence is inadequate to demonstrate the finding of no chronic effects (Wennekens, 1975; Wright, 1975; NOAA, 1979; Richards, 1979; Reisch and Carr, 1978).

A symposium on the environmental fate and effects of drilling fluids and cutting was recently held to report new research and synthesize knowledge (American Petroleum Institute, in press). The symposium did not unequivocably demonstrate chronic effects of drilling effluents and cutting discharges. The symposium did not provide any demonstration of long-term effects (e.g., 15-20 years) of muds and cuttings on the marine environment. Due to the multiplicity and complexity of variables in the marine environment, of which only a few can be incorporated into a single experimental design, the determination of chronic effects from muds and cuttings discharges will probably remain a question for some time.

Table IV.A.2.b.-1 gives a summary of finfish and shellfish species, habitat, season of occurrence, and the potential interaction of oil with these items. For more detailed information regarding these interactions, refer to ADF&G (1978), Malins (1977), and USDI (1976).

Salmon, herring, steelhead trout, and other pelagic (free swimming) finfish species and demersal (bottom dwelling) finfish species, such as halibut and walleye pollock, are found throughout the Shelikof Strait and lower Cook Inlet areas. These finfish have been divided into groups for describing impacts.

Table IV.A.2.b.-1
Fish Species, Habitat Use, and Potential Oil Interactions

Species of Biota Group	Principal Habitat	Areas of Peak Occurrence	Season of Peak Occurrence	Area Use by Biotic Group	Potential Oil Biota Interaction
ADULTS Sockeye	Congregate in Estuaries	Nearshore, Anadromous Streams with Lakes; Karluk, Red, and Frazer Rivers (westside Kodiak)	Mid-May to Early July	Spawning migration	Behavioral; Block access to spawning streams
Pink	Congregate in Estuaries	Nearshore; Anadromous Streams; Intertidal; Most streams around Kodiak	July to Mid-August even years	Spawning; spawning migration	Behavioral; Block access to spawning areas; Toxic to spawn
Chum	Congregate in Estuaries	Nearshore; Anadromous Streams; Intertidal; West and Southeast sides of Kodiak	Late July to Late October	Spawning; spawning migration	Behavioral; Block access to spawning areas; Toxic to spawn
Coho	Congregate in Estuaries	Nearshore; Anadromous Streams; Northeast and Southwest corners of Kodiak Island	July to Late November	Spawning migration	Behavioral; Block access to spawning areas
	Pelagic, Surface	Throughout the Gulf of Alaska	Winter, Spring	Feeding	Deplete food source; Behavioral; Ingestion
Chinook	Congregate in Estuaries	Nearshore; Anadromous Streams; West-side Kodiak Island	Mid-June to Late August	Spawning migration	Behavioral; Block access to spawning streams
	Pelagic	Surface; Large Bays and open ocean	Winter, Spring	Feeding	Deplete food source; Behavioral; Ingestion
Steelhead	Congregate in Estuaries	Nearshore; Anadromous Streams;	Spring and Fall	Spawning migration	Behavioral; Block access to spawning stream
	Estuaries	Nearshore	Fall and Early Winter	Feeding; overwintering	Additional stress on spent spawners; Ingestion

Table IV.A.2.b.-1
Fish Species, Habitat Use, and Potential Oil Interactions--continued

Species of Biota Group	Principal Habitat	Areas of Peak Occurrence	Season of Peak Occurrence	Area Use by Biotic Group	Potential Oil Biota Interaction
Dolly Varden	Congregate in Estuaries	Nearshore; All Anadromous Streams	Late June to October and Early Winter	Spawning migration	Behavioral; Block access to spawning streams
JUVENILES					
Sockeye	Enter Estuary after 1-3 years in fresh water lakes	Nearshore; Surface;	May to August	Smolting; Feeding	Toxicity; Reduced food supply; Behavioral; Ingestion
	Seaward Migration	South and west along the Continental Shelf; Surface	August to October	Outmigration; Feeding	Toxicity, Behavioral; Ingestion
Pink	Enter Estuary	Nearshore; Surface	October to November	Smolting; Feeding	Toxicity, Reduced Food supply; Behavioral; Ingestion
	Seaward Migration	South and west along the Continental Shelf; Surface	October to November	Outmigration; Feeding	Toxicity; Behavioral; Ingestion
Chum	Enter Estuary	Nearshore; Surface	March to June	Smolting; Feeding	Toxicity; Reduced food supply; Behavioral; Ingestion
	Seaward Migration	South and west along the Continental Shelf; Surface	Mid-August to Late Fall	Outmigration; Feeding	Toxicity; Behavioral; Ingestion
Coho	Enter Estuary	Nearshore; Surface	March to July	Smolting; Feeding	Reduced food supply; Behavioral; Ingestion
	Seaward Migration	South and west along the Continental Shelf; Surface	Late Summer to Early Winter	Outmigration; Feeding	Behavioral; Ingestion

Table IV.A.2.b.-1
Fish Species, Habitat Use, and Potential Oil Interactions--continued

Species of Biota Group	Principal Habitat	Areas of Peak Occurrence	Season of Peak Occurrence	Area Use by Biotic Group	Potential Oil Biota Interaction
Chinook	Enter Estuary	Nearshore, Surface	June to Late August	Smolting; Feeding	Reduced food supply; Behavioral; Ingestion
	Seaward Migration	South and west along the Continental Shelf; Surface	Fall to Early Winter	Outmigration; Feeding	Behavioral; Ingestion
Steelhead	Enter Estuary	Nearshore; Surface	Early June to Mid-July	Smolting; Feeding	Reduced food supply; Behavioral; Ingestion
	Seaward Migration	South and west along the Continental Shelf; Surface	Unknown	Outmigration; Feeding	Behavioral; Ingestion
Dolly Varden	Enter Estuary	Nearshore; Surface	Early April to Late June; September to October	Smolting; Seeking overwintering streams; Feeding	Toxicity, Reduced food supply; Behavioral; Block access to overwintering streams; Ingestion
EGGS AND HATCHING					
Pink	Intertidal	East and West Sides of Shelikof Strait and lower Cook Inlet	Late July to May	Incubation; Hatching; Emergence	Smothering; Toxicity
Chum	Intertidal	Same as Pink	Late July to May	Incubation; Hatching; Emergence	Smothering; Toxicity
ADULTS					
Herring	Rocky Beach	Intertidal; Shallow Subtidal Same as Pink Salmon	Mid-May to Mid-June	Spawning	Inhibit spawning; Toxic to spawn

Table IV.A.2.b.-1
Fish Species, Habitat Use, and Potential Oil Interactions--continued

Species of Biota Group	Principal Habitat	Areas of Peak Occurrence	Season of Peak Occurrence	Area Use by Biotic Group	Potential Oil Biota Interaction
	Benthic Overwintering	Near Bottom; approx. 50 fathoms Westside of Kodiak Island	Late Fall through Winter	Overwintering; No feeding	Behavioral
EGGS AND LARVAE Herring	Rocky Beach	Nursery Intertidal; Shallow Subtidal; Bay Areas	May to June	Incubation; Hatching	Toxicity; Smothering Reduced hatch
	Nearshore	Nursery Intertidal; Shallow Subtidal	May to Late Fall	Feeding	Reduced food supply; Toxicity; Ingestion
JUVENILES Herring	Nearshore	Surface; Bays and Inlets	Late Fall, Winter, Spring,	Feeding	Reduced food supply; Behavior; Toxicity; Ingestion
ADULTS Sablefish	Demersal	OCS deeper than 200 meters	Year-round	Feeding	Reduced food supply; Behavior; Toxicity; Ingestion
EGGS THROUGH LARVAE Sablefish	Pelagic	Surface of Shelikof Strait and lower Cook Inlet possibly	Early Spring to Late May	Incubation; Hatching; Feeding	Toxicity; Reduced food supply; Ingestion
EGGS Pacific Sandlance	Demersal	Sandy Bottom; Nearshore; 25-100 m water depths	Winter	Spawning; Incubation	Toxicity; Behavioral

Table IV.A.2.b.-1
Fish Species, Habitat Use, and Potential Oil Interactions--continued

Species of Biota Group	Principal Habitat	Areas of Peak Occurrence	Season of Peak Occurrence	Area Use by Biotic Group	Potential Oil Biota Interaction
JUVENILE Pacific Sandlance	Demersal	Sandy Bottom; Offshore	Summer to Early Fall	Feeding	Toxicity; Behavioral; Reduced food supply; Ingestion
Adult Walleye Pollock	Pelagic	OCS between 100 and 200 meters	Late Summer	Feeding	Ingestion
Eggs & Juvenile Walleye Pollock	Pelagic	Inshore, bays, southeast Trinity Isle., Kiliuda Borough	March to June	Maturation	Toxicity, reduced food
Atka Mackerel	Demersal	10-20 m depths nearshore; Rocky swift current areas	Summer	Spawning	Toxicity; smothering spawn
ADULTS Pacific Cod	Demersal	Inshore embankments to; Intertidal	December to March	Spawning	Toxic to spawn; Inhibit spawning
LARVAE Pacific Cod	Demersal	Rocky; Shallow Subtidal; Intertidal	January to Late June	Feeding	Toxicity; Reduced food supply; Ingestion
Pacific Ocean Perch	Demersal	Shelf break and slope; 200-meter depths	Year-round	Spawning; Maturation; Feeding	Possible ingestion
Other rockfish	Demersal	Shelf break and slope;	Year-round	Spawning; Maturation; Feeding	Possible ingestion

Table IV.A.2.b.-1
Fish Species, Habitat Use, and Potential Oil Interactions--continued

Species of Biota Group	Principal Habitat	Areas of Peak Occurrence	Season of Peak Occurrence	Area Use by Biotic Group	Potential Oil Biota Interaction
ADULTS English Sole	Demersal	Nearshore	Winter, Summer	Spawning Feeding	Toxic to spawn; Behavioral
EGGS AND LARVAE English Sole	Pelagic	Surface; Nearshore	Winter; Spring	Incubation; Feeding	Toxicity; Reduced food supply; Ingestion
ADULTS Petrale Sole	Demersal	Deep water areas		Feeding	Ingestion
ADULTS Dover Sole	Demersal	Deep water areas	Spring, Summer	Feeding	Ingestion
ADULTS Starry Flounder	Demersal	Nearshore	Winter; Summer	Spawning Feeding	Toxic to spawn; Behavioral, reduced food supply
EGGS AND LARVAE Starry Flounder	Pelagic	Near surface	Winter, Spring Summer	Incubation; Feeding	Toxicity; reduced food supply; Ingestion

Table IV.A.2.b.-1
Fish Species, Habitat Use, and Potential Oil Interactions--continued

Species of Biota Group	Principal Habitat	Areas of Peak Occurrence	Season of Peak Occurrence	Area Use by Biotic Group	Potential Oil Biota Interaction
ADULTS Pacific Halibut	Demersal	Near bottom; Near 200 m isobath; lower Cook Inlet	Winter	Spawning	Toxic to spawn; Behavioral
EGGS & LARVAE Pacific Halibut	Pelagic	Surface to 200-meters lower Cook Inlet	Spring, Summer	Incubation; Feeding	Toxicity reduced
ADULTS Capelin	Pelagic	Nearshore; Near Surface; Pebbly beaches.	May to June	Spawning	Toxicity; Toxic to spawn; Behavioral
ADULTS King Crab	Deep water; Come into shallow water to spawn	Kachemak Bay, Bays, east side of Shelikof Strait.	June to August	Feeding; Spawning depth	Low probability because of water
JUVENILES King Crab	Shallow water to 100 m	Lower Cook Inlet, Shelikof Strait. Bays and Inlets.	Year-round	Feeding; Rearing	High potential for adverse effects
LARVAE King Crab	Semipelagic to benthic in shallow water	Bays, Inlets, especially Kachemak Bay	Semipelagic March-July	Feeding; Rearing	Toxicity to larvae high

Table IV.A.2.b.-1
Fish Species, Habitat Use, and Potential Oil Interactions--continued

Species of Biota Group	Principal Habitat	Areas of Peak Occurrence	Season of Peak Occurrence	Area Use by Biotic Group	Potential Oil Biota Interaction
ADULTS Tanner Crab	Deep water to 50 m when spawning	Bays and Inlets, especially Kachemak Bay.	January-May in shallow water	Feeding; Spawning	Low probability because of water depth
LARVAE Tanner Crab	Semipelagic to benthic in shallow water	Bays and Inlets, especially Kachemak Bay.	Semi-pelagic March	Feeding; Rearing	Toxicity to larvae high
ADULTS Dungeness Crab	To tide line; during spawning;	Bays and Inlets; east-west sides of Shelikof Strait and Kachemak Bay.	Spawn October-December	Feeding; Spawning	Medium probability summer; Low in winter
LARVAE Dungeness Crab	Semipelagic to benthic in shallow water	Bays and Inlets; east-west sides of Shelikof Strait and Kachemak Bay.	Semi-pelagic June-December	Feeding; Rearing	Toxicity to larvae high
ADULTS Shrimp	Deep water (days) To surface (nights) Spawn in bays and around islands	Bays and Inlets east and west of Shelikof Strait and Kachemak Bay.	Year round spawn; Spawn August-September	Feeding; Spawning	Can affect eggs (carried on females) and food
LARVAE Shrimp	Semipelagic to benthic in shallow water	Bays and Inlets east and west of Shelikof Strait and Kachemak Bay.	February-July	Feeding; Rearing	Toxicity to larvae larvae high

Table IV.A.2.b.-1
Fish Species, Habitat Use, and Potential Oil Interactions--continued

Species of Biota Group	Principal Habitat	Areas of Peak Occurrence	Season of Peak Occurrence	Area Use by Biotic Group	Potential Oil Biota Interaction
ADULTS					
Scallop	60-180 meter depths; Benthic	Not in proposed sale area	Year-round	Feeding; Spawning	Low probability because of depth
LARVAE					
Scallop	Planktonic near surface	Not in proposed sale area.	June to July	Feeding; Rearing	Toxicity to larvae high

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Source: U.S. Dept. of Commerce, 1978; State of Alaska (ADF&G, 1978).

Impact on Demersal Species

Pacific halibut and other flatfish are ocean bottom dwellers that have free-floating eggs and larvae. A few months (1-3) after fertilization, the eggs become buoyant and generally float at or near the surface for 1 to 3 months. After the eggs hatch, the larval fish remain at the surface of the water until metamorphosis when the young fish return to the ocean bottom to feed and grow to maturity. It is during this free-floating period that these types of fish are most vulnerable to pollution events on and in the water. In addition to eggs from the Kodiak offshore areas, eggs from the western and northern Gulf of Alaska drift to the west and settle out near Kodiak. It would, therefore, be reasonable to assume that, should a chronic or massive hydrocarbon spill occur during these critical life stages, the population of eggs and/or larvae would be reduced. There is presently no way to quantify the extent of such an impact.

Information contained in the oilspill risk analysis (sec. IV.A.1.d. and appendix D) indicates that the areas containing high populations of halibut along the northeast shore of Kodiak Island have a high probability of being contacted by a pollutant event because of this proposal. The areas from Uganik Bay to Malina Bay are especially vulnerable to pollutant events. This is about one-fifth of the area with high halibut population within the proposal. It is more likely that an oilspill would affect larval or young forms of halibut than adult forms because these subadult forms inhabit shallow water. While it has been reported by some fishermen that halibut seem to follow the salmon into bays (Blackburn, 1980), most of the commercial catch occurs in water from 60 to 140 meters (197 to 495 ft). It is not likely that deep water would be contacted by lethal amounts of oil from a spill. The many natural variables and the effect of commercial fishing on this species could mask any population change caused by the proposal.

Groundfish species such as walleye pollock, Pacific cod, black cod, Pacific Ocean perch, and flatfish are all demersal forms that live in deep water. The eggs and/or larval stages of these fish are free floating and are vulnerable to oil contamination for a period after the adults spawn. Should the juvenile portion of the population be killed by a massive event, which is not likely, the entire population would be affected. Decline or elimination of a year class could have major economic effects in subsequent years, as well as probable significant biological effects on the population.

Walleye pollock and Pacific cod are known to be present in large numbers in Shelikof Strait. If an oilspill were to occur during the time the larvae are present in the upper part of the water column, populations of these species could be reduced. The effect may not be apparent for several years (when the adults enter the fishery) and may not be directly attributable to a pollutant event. These effects cannot be quantified, but because of the high number of probable events (four probable spills are associated with this proposal), it can be hypothesized that some reduction of the bottomfish species for 1- or 2-year classes could occur.

In Shelikof Strait and Cook Inlet, herring move inshore to spawn generally from May through mid-June; however, the peak of spawning varies greatly from year to year. Herring generally spawn on or near living plants such as eelgrass, kelp, or other algae, and rocky substrates. Herring spawning has been documented or reported in nearly every bay on the west side of Kodiak Island (Blackburn, 1980; also see graphic 2 of this EIS). On the west of Shelikof Strait, herring spawning has been documented only in Kukak Bay (Blackburn, 1980). In Cook Inlet, spawning has been documented in the Kamishak Bay area, Kachemak Bay, and near the Forelands.

Hatching time varies with temperature, but averages 15 days from spawning to hatching. The larvae are very delicate and subject to environmental influences (Smith, 1976). Young herring collect in small schools and gradually move seaward toward the mouths of bays or inlets where they grow rapidly and consolidate into large schools. These schools move into deep water by late fall. It is possible that these fish move into the proposed sale area. While offshore, they spend much of their time at or near the water surface.

A massive hydrocarbon spill or chronic pollution that contacted herring spawning areas during the 3- to 4-week reproductive period could have a significant impact on adult, egg, and larval mortality. Natural prehatching mortality varies from about 60 to 90 percent, and larval mortality is thought to be as much as 99 percent (Smith, 1976). Any additional stress on this life stage could adversely affect whole year classes with subsequent decline of commercial stocks in the adult year periods.

The only documented herring spawning areas facing high oilspill risk from this proposal are the Kamishak Bay area and Kukuk Bay (fig. IV.A.1.d.-10.). If an oilspill occurred and contacted these areas during the period when larvae or young are present, there would likely be some reduction in the population of herring. Based on information contained in the oilspill risk analysis (sec. IV.A.1.d.), most probable impacts on populations of herring in the Shelikof Strait area would be low to moderate because areas of high use by herring are not at high risk from oilspills.

In most finfish populations, the adults would be less affected than larval and juvenile forms. Those fish species (groundfish, halibut, etc.) whose larvae and juvenile life stages live in the upper surface of the water column and within 10 days of a possible spill point (sec. IV.A.1.d.) would be most vulnerable. The oilspill trajectory model indicates that virtually all of the salt water fish habitats in or adjacent to the proposed lease area would be at some degree of risk (sec. IV.A.1.d. and appendix D) from the spills associated with this proposal.

The extent of the impact resulting from an oilspill would depend upon the magnitude of the spill, the trajectory a spill would take, and the length of time it is in a particular habitat.

Conclusion: There is a possibility that some groundfish, halibut, and herring populations in Shelikof Strait and Cook Inlet may be reduced by some unquantifiable amount during the life of this proposal. Oilspills exceeding 1,000 barrels are projected to occur four times during the life of this proposal (appendix D). If they occurred when the eggs or larvae of these species were not present (about 6 months of the year), no effects would likely be attributable to oil and/or gas production. If eggs or larvae were present during an oilspill event, only those that actually came in contact with an oil slick or the water soluble fractions of oil around or below the slick would be adversely affected.

Based on the oilspill risk analysis presented in section IV.A.1.d. and appendix D, the probability of an oilspill affecting some of the species described above is high. Bottomfish species, except halibut, may be more adversely affected by this proposal than the other species discussed above because of their widespread distribution in Shelikof Strait and their presence in the high probability of risk area.

Cumulative Effects: When existing and assumed oil and gas activities in lower Cook Inlet (sale CI and oil tankering) are considered, oilspill risks are increased, significantly in some areas, compared to those associated with the proposal alone. Oilspill risk is high at Anchor Point in lower Cook Inlet, the Barren Islands, Kukak and Kuliak Bays on the west side of Shelikof Strait, the northwestern side of Afognak Island, and along the west coast of Kodiak Island from Kupreanof Strait to Uganik Bay. Herring spawning has been documented in all of these areas (Blackburn, 1980).

In general there would be an increased probability that the demersal species mentioned in preceding pages would be affected by an oilspill. For those species that are commercially fished, quantification of impacts may be impossible at any time because of the masking effect of the fishery and the natural variability of populations caused by mortality of juveniles due to natural causes.

Unavoidable Adverse Effects: There would probably be unavoidable fish population reductions. Chronic pollution and/or habitat alteration could also affect populations, probably for the life of the project and the recovery period afterwards.

Impact on Salmon Species

Because of their dependence on inshore areas for migration routes, spawning, larval survival, and juvenile feeding, salmon may be the most vulnerable commercial finfish species to be affected by this proposal. Adult salmon, and salmon larvae and fry inhabit nearshore waters and rivers near the proposed sale area from at least May to September. Due to the relatively short period of time oilspills would take to reach coastal locations near the proposed sale area (1-10 days), and the biologically critical nature of the spawning and rearing areas that would be reached, it appears likely that oil development and production activities could result in adverse effects on some populations of salmon that live all or any part of their lives in nearshore areas. A major oilspill, which could result from a tanker collision, a major pipeline rupture, or a well blowout, could cause salmon to avoid inshore waters that are contaminated with oil and could result in depletion of some local salmon populations for one to several years. Salmon populations that use the area from Uganik Bay to Malina Bay, Kukak and Kuliak Bays, and those that spawn in Kamishak Bay may be more adversely affected than the populations using other locations near the proposed sale area (see oilspill risk analysis, sec. IV.A.1.d.). The severity of adverse impact would depend on the time of year the event occurred, the amount and type of oil spilled, and the length of time the oil would be on the water before reaching shore, the weather conditions at the time of the spill, the physiography of the area in which the oil is spilled, and the amount of time between damaging oilspills.

Juvenile and larval salmon appear to be the most sensitive to the toxic effects of oil (Rice, 1973). If an oilspill occurred and contacted nearshore areas where salmon larvae were present, some mortality could result. In addition, larvae would be vulnerable to death from starvation if their food supply of phytoplankton and zooplankton were killed by a massive spill (Hunter, 1972). Salmon fry, especially pink salmon, remain in estuarine locations near the proposed sale area for several months, and would be especially vulnerable to oilspills that reached shore during that time.

Pink salmon are the most vulnerable of the salmon species to oilspills. They reside in intertidal areas nearly year-round. In addition, pink salmon have alternate-year high spawning populations, so that if a spill occurred and contacted them during that year, especially during periods of high concentrations of larvae or fry, mortality could result, adversely affecting local populations far into the future.

The sublethal effects from oil pollution, especially from the chronic low-level discharge of oil into the marine environment, are potentially dangerous to fish. Feeding, reproduction, and social behavior in fish have been disrupted by soluble aromatic derivatives as low as 10 to 100 parts per billion (Todd et al., 1972; Sondheimer and Simeone, 1970). Interference with predator detection of prey is also possible (Whittle and Blumer, 1970). Migratory and homing detection could also be disrupted (Nelson-Smith, 1973). If chronic oil pollution were to occur near major salmon migration paths, certain runs could be eliminated. Because of pink salmon inhabit shallow salt water for long periods of time, they would be particularly vulnerable to this type of oilspill.

A significant impact on a salmon population could occur if closely spaced, multiple pollution events detered or destroyed a breeding population, larvae or fry, or breeding areas of larvae or fry. A setback of 10 to 20 percent, or 2 to 4 spawing seasons could result. Recovery would be slow and difficult if coupled with exposure to chronic pollution events.

Conclusion: A pollutant event caused by this proposal could adversely affect a year class or more of fry as well as a year class or more of adults. Pink salmon populations would be more susceptible to adverse effects from this proposal than the other species. Juvenile salmon and salmon larvae appear to be more vulnerable to the toxic effects of oil than other life stages of salmon. Salmon populations that use the area from Uganik Bay to Malina Bay, Kukak and Kuliak Bays, and those that spawn in Kamishak Bay may be more adversely affected than the populations using other locations near the proposed sale area because the risk of an oilspill contacting these areas is high (see fig. IV.A.1.d.-6.).

Some population reduction could be expected near the pipeline landfall and the tanker loading area. It is estimated that this reduction would be short lived, possibly only through the construction stage and the population recovery time (2-4 years).

Cumulative Effects: The risk of an oilspill contacting the coastline near the proposed sale area is increased when existing and assumed oil and gas activities in lower Cook Inlet (sale CI and oil tankering) are considered in addition to those assumed for the proposal. The probability of oilspills adversely affecting salmon populations is also increased. Impacts would be similar to those described for the proposal, but could be more severe.

Unavoidable Adverse Effects: There may be a lowering of some local salmon populations because of this proposal.

Crab Species

The three major species of crab (king, tanner, and Dungeness) have similar life histories in that the adults spend the winter months in deep (150-450 m (492-1,476 ft)) oceanic waters, and migrate to shallow (6-20 m (20-66 ft)) water in the spring or early summer. The eggs, which have been carried by the female for about a year from the previous year's spawning activities hatch and the young spend from 1 to 4 months (March-June) as free swimming planktonic larvae. After the larval stage, the juveniles assume the adult form, settle to the bottom, and spend from 1 to 5 years in shallow bays and estuarine areas before joining the adults on their migrations.

The larval forms are more susceptible to floating hydrocarbons; the juveniles are somewhat susceptible to hydrocarbons on and beneath the surface of the water. The adults would be affected by the oil that sinks to the bottom. All age groups would be affected by the reduction of food species. In the event of a large pollutant event, the young could be killed and thus reduce the potential adult population. If these hydrocarbons settle to the bottom, the adults may also be killed, further reducing the population. Population reductions would affect the fishery. Crabs could be flavor tainted by contact with hydrocarbons and other pollutants, thus reducing their value.

Exposure to chronic pollution associated with oil/gas development and production could affect the larval and juvenile life stages of crab and other shellfish species. King and Dungeness crabs spend lengthy periods in shallow water; tanner crabs spend some time in shallow water. Effects of chronic exposure are as yet unknown, but could range from impairment of development through direct reaction on the animal or because food species are killed.

Studies by Rice and others (1976) tested Cook Inlet and other oils on a number of oceanic organisms, including larval tanner and Dungeness crab and juvenile king crab. They found that juvenile king crab quickly accumulated methylnapthalene and other aromatic compounds of oil in their body tissue and were able to quickly cleanse themselves after they were transferred from the contaminated water to clean water. They also found that at concentrations of oil equal to or just below the 96-hour TLm (medium tolerance limit) juvenile king crab respiration rates were depressed, indicating stress. Measurement of metabolism, however, does not appear to be a sensitive indicator of oil toxicity to crabs. In these studies, larval forms of tanner and Dungeness crab exhibited relatively high (10.8 and 7.1 ppm of oil, respectively) TLm to Cook Inlet oil. The median effective concentration (ECm), or the amount of oil it takes to induce moribundity in larvae, however, was approximately 2 ppm for both species. Larvae can exist in the moribund stage several days before dying. Larvae do not recover from this stage. Of the life stages tested in this study, larvae appeared to be the most vulnerable to oil. From a quantitative standpoint, larvae were most sensitive to oil toxicity, especially during molting. Crustacean larvae may be particularly susceptible to oil toxicity compared with adults because they molt frequently.

Individual organisms subjected to sublethal exposures may undergo "ecological death" if they are incapable of adjusting to natural stresses in their environments because of this exposure. For example, during bioassay testing, postmolt tanner crab lost as many as seven legs, including both chelae, during short exposures to crude oil (Karinen and Rice, 1974). Even though the crabs lived through the exposure, they would not have survived in the natural environment.

Chronic exposure may adversely affect a portion of the population if the adults' ability to reproduce is seriously impaired. Physiological changes, such as reduced fecundity and delayed ovary development, or impaired behavioral mechanisms preventing location and identification of mate or timing of spawning can impair reproduction. Thus, although chronic exposure might not directly kill the adult, it could adversely affect its ability to reproduce successfully so that, eventually, a portion of the population using the polluted habitat could be eliminated.

Some fractions of oil may sink to the bottom (Friede, et al., 1972), where they remain for some time and could taint shellfish. Instances have been cited where shellfish were tainted and their marketability was reduced by exposure to even slight amounts of oil (Blumer et al. 1970; Wilber, 1969).

Conclusion: There is a possibility that populations of king, tanner, and Dungeness crab could be reduced by activities associated with oil and gas production in the proposed lease area. Egg and larval forms are most susceptible to adverse impacts from pollutant events associated with the project. Extent of impact would vary by time of year, amount and kind of event, and the area in which the event takes place.

Chronic pollution events covering egg release and larval rearing areas could reduce the populations of these areas substantially. However, because there is commercial harvest of these species, assessment of cause of population reduction would be difficult.

Additional impacts caused by oil and/or gas development in Cook Inlet and Shelikof Strait could have moderate local effects on the crab populations. A major spill in an area of high crab larvae populations is also a possibility. If such an event were to occur, larvae crab populations in the area could be severely reduced.

The relatively confined area of the proposed lease area and the possibility of four major pollutant events over the life of the project (appendix D) indicates that there would probably be a reduction of some crab populations caused by the events associated with the proposal. The reduction may be local (individual bay/nursery areas) or widespread (larval drift areas). Those crab populations using the area between Uganik and Malina Bays, Kamishak Bay, and near Augustine Island have a higher probability of being adversely affected by oilspills than populations using other areas because the area between these areas face high risk from oilspills (see sec. IV.A.1.d.).

Dredging during pipeline laying in crab rearing areas, could result in some crab mortality.

Cumulative Effects: In addition to the areas of high risk from potential oilspills mentioned above, most of the northern half of Shelikof Strait would face moderate to high risk. All three species of crab (king, tanner, dungeness) use this area. The Anchor Point area, but not Kachemak Bay, would be at high risk also.

Crab eggs and larval crabs would probably receive the brunt of the impacts; however, should food sources become contaminated or reduced, the adult population could be directly affected. There is no way to quantify these effects. Even determination of the cause of population decrease would be difficult because of the commercial fishery and natural variability of these resources.

Unavoidable Adverse Effects: A portion of one or more year class of any of the three crab species discussed could be eliminated because of one or more major spills. Chronic low-level pollution and dredging for offshore pipelines could alter a portion of the habitat to make it unsuitable for these species for a period of time.

Impact on Shrimp Species

The shrimp fishery is composed of five species of Pandalid shrimp: the pink, humpy, coonstripe, sidestripe, and spot. Approximately 97 percent of the catch is pinks. Mating occurs in September in coastal shallows with the eggs carried offshore by the females until they hatch the following March and April (McLean et al., 1976). Young shrimp are found primarily in shallow water in bays and move into deeper water as they grow. Shrimp inhabiting shallow water are the most susceptible to oil pollution. Natural sex transformation occurs over several adult molt stages in March or April. It is during these molt periods adult shrimp are most susceptible to pollution effects (Rice, et al., 1976). Adults undergo daily vertical migrations and are in the upper waters at night where they would be most vulnerable to contact with hydrocarbons.

Of the four species of shrimp considered in a past study (USDI, 1976), pink shrimp was the least resistant to water soluble fractions of crude oil. Shrimp larvae are apparently more sensitive to hydrocarbon toxicity at the time of molting, and later larval stages suffer a higher mortality rate than early larval stages. Larvae of spot shrimp appear to be much more sensitive to naphthalenes, an oil component, than previously demonstrated. Concentrations as low as 8 ppb (parts per billion) cause narcosis (sleep or inactivity) followed by death in 1 or 2 days. In addition, shrimp larvae concentrate naphthalene and a naphthalene-protein complex 25 to 100 times the exposure levels, leading to the conclusion that ". . . aromatic hydrocarbons acquired in food may be metabolized quite differently from such compounds acquired from other routes . . ." (Sanborn and Malins, 1976).

Based on information in the oilspill risk analysis (appendix D and sec. IV.A.1.d.) and catch statistics for the proposed sale area (sec. III.B.2.d.), local shrimp populations, especially between Malina and Uganik Bays, Kukak Bay, and the widespread larval drift area off Kachemak Bay, could be affected adversely.

Conclusion: Reduction of some local shrimp populations could result from chronic or massive pollution events. The population decline would depend on life stage affected, areal extent of the event, and length of time of occurrence. At maximum pollutant levels, a marked decrease would be possible so that the local shrimp stocks and fishery would decline for a relatively short period. Based on information contained in the oilspill risk analysis (appendix D) and catch statistics for the proposed sale area (sec. III.B.2.d.), local populations, especially between Uganik and Malina Bays, on the west side of Kodiak Island, or the widespread larval drift area off Kachemak Bay could be adversely affected.

Cumulative Effects: As time passes, a cumulative long-term sublethal and chronic contamination of shrimp may occur as a result of this proposal, primarily in the Shelikof Strait area. However, the amount of population reduction cannot be measured.

The cumulative effects would be similar to the general effects described above, but the probability of them happening would be greater.

Unavoidable Adverse Effects: Chronic, low-level discharges of petroleum could result in a local long-term reduction of shrimp populations in the area where product treatment and shipping take place. Severity of impact would depend on location of the treatment plant in relation to the shrimp and the ability of the area to dissipate toxic substances.

Impact on Other Shellfish

The razor clam is the principal clam species harvested, and is presently distributed along 21 major beaches within the Shelikof Strait area (graphic 4). Of these, 14 beaches have supported commercial harvests at some time. Presently, Swikshak Beach is the only beach in the Kodiak area which has clams certified safe for human consumption (ADF&G, 1976). Recently, razor clams have been commercially harvested from beaches near Polly Creek on the western side of Cook Inlet. Most other clam beaches have not been checked or certified by the State.

Egg development commences in May and June. Ovulation and fertilization occur in July and August with larvae settling out of the water column in September. The duration of the mating period is approximately two tidal cycles and is highly dependent upon temperature.

Clam larvae are the most vulnerable to pollutant events in the summer and fall. Clams, by straining the surrounding water for food particles, can concentrate hydrocarbons in their tissues (Stainken, 1975). Even a slight amount of oil can taint clams (Blumer, et al. 1970, Wilber, 1969).

Chronic exposure to low concentrations of oil may be detrimental. Seawater extracts of oil have been found to have toxic effects on three survival functions in molluscs: 1) inability to attach to substrate, 2) depressed rate of shell closure resulting in greater exposure to predators, and 3) inhibition of oxygen uptake (Dunning and Major, 1974).

When clams (Macoma sp.) were oiled by Prudhoe Bay crude, they showed a range of effects. Some moved from the sediments to the surface and died from the oil-contaminated sediments. Those which did not die may not have survived in nature where they would have been vulnerable to predation or adverse environmental conditions.

If a major hydrocarbon spill were to reach nearshore areas in less than a day, severe damage could result from smothering. Repeated pollution of clam beds could occur from hydrocarbons that become mixed in the sediments.

Scallops are found in Cook Inlet, with the greatest numbers found between Augustine Island and the Barren Islands. They are also present on the west side of Shelikof Strait near the proposed lease area and along the east side of Shelikof Strait south of the proposed lease area. They are generally found in water depths of 30 to 70 fathoms (180-420 ft).

Scallops mature sexually in their third year. Spawning probably begins in early June and may continue until early July. Spawning males and females release sperm and eggs into the water where fertilization occurs. The eggs settle to the bottom and adhere to the substrate. After two or three days the eggs hatch and the larvae begin a two and one-half week planktonic phase. At the end of this time the individual settles to the bottom as a juvenile.

Because they inhabit deep water during most of their life, scallops would not likely be affected by any oilspills that might occur with this proposal.

Conclusion: Razor clam beaches in Shelikof Strait have a greater probability of being affected by the proposal than those along Cook Inlet. Because of the high number of probable spills, the liklihood of their contacting nearshore areas where razor clams are present and the relatively long period of time oil can remain in a toxic state in sediments, it is likely that some local clam populations could be reduced during the life of the project. Depending on how soon oil gets to the beaches and how much is incorporated into the beach sand and mud, recovery rates may be very long (10+ years) (see sec. IV.A.1.e.). Little is known about the effects of hydrocarbons on scallops, but because they inhabit deep water during most of their life, it seems unlikely that they would be adversely affected by an oilspill resulting from this proposal.

Cumulative Effects: There is a greater chance that razor clams could be affected by pollutant events because there is a greater probability that oil would reach nearshore areas under the cumulative case. Little is known about the effects of hydrocarbons on scallops, but because they inhabit deep water during most of their life it appears unlikely that spilled oil would contact and adversely affect them.

Unavoidable Adverse Effects: Depending on location of shoreside facilities, unavoidable impacts could be short-lived (construction away from the clam beaches) or permanent (clam beaches covered by facilities). Extent of the impact cannot be estimated.

c. Impacts on Commercial Fishing: This topic has been identified as a major scoping issue. Analysis of impacts of this proposal on fish populations in section IV.A.2.b. estimated that pink salmon would be the fin fish species most adversely affected by a pollutant event. Impacts on crab and other shellfish would be expected to be local. Therefore, local reductions of fish populations could affect the commercial fishermen using the fish resources of those areas.

There is estimated to be from one to four exploratory vessels in use at any time. Exploratory activities in the United States have been extremely nonpolluting and if maritime support and supply activities are based at Nikiski, it is estimated that little, if any, effect will be felt by commercial fishermen during the exploratory phase of this proposal.

Should maritime support and supply activities come out of Homer, there could be some impacts from conflicts for maritime materials and possibly some gear loss (crab pots) unless travel routes are defined. These impacts are estimated to be minor, mitigatable, and short term.

Should production occur, there could be several adverse impacts attributed to the proposed lease sale. These impacts would be similar in all fisheries, although different in magnitude. These impacts are loss of fishing gear, loss of fishing area, competition for labor and materials, inability to market fish because of flavor tainting, and loss of fishing time because of proposed activities. In the past, vessels associated with the oil industry have provided aid to fishing vessels in distress, and weather information provided by personnel on drill rigs has been an aid to fishermen.

Fishing gear has been lost during the exploratory and production phases of offshore oil and gas development. Seismic, and support and supply boats, if unregulated, have and probably would run through fishing grounds and damage fishing gear. Crab pot fishermen would probably suffer the most. Running gear can destroy the floats or move pots into water so deep the floats cannot be seen. In communities such as Homer, Seldovia, or Kodiak, replacement pots (costing $500 or more) may not be available after the season starts. Shipment of pots from Seattle can take several months, at which time the crab quota may be taken or the season ended and the fishing over. The Fishermen's Contingency Fund (appendix G of the DEIS) provides for payment for loss of or damage to fishing gear due to OCS-related activities. It also provides for payment for loss of profits due to such gear loss. See section I.C. for further discussion of this fund.

All the fishermen would probably not suffer gear loss at the same time, but more than one fisherman could be affected in any year. The severity of impact would depend upon when this happens during the season, how many pots are lost, and how soon replacements are made.

Salmon or herring gill nets that are fouled during a pollutant event is another type of gear that could be lost because of the proposal. The chance of loss is less because of the smaller chance of spills coming to shore, the shorter timeframe that gear is in the water, the presence of the owners while they are fishing, and the areas fished. Impacts would not be as severe as with lost pots, and replacement of gear would be faster and cheaper.

Production areas including anchoring and an avoidance area would equal about 800 hectares (2,000 acres) per production rig. Four production rigs are assumed for the mean case of this proposal. Therefore, approximately 3,200 hectares (8,000 acres) of ocean bottom would be required for the production platforms needed to produce the estimated oil and gas reserves within this proposal. Ground fish and halibut fishermen would probably be most affected by this loss of fishing habitat, but in this case the effects would be minimal. Site restriction for protection of biological and, therefore, commercial species are already in force to further reduce impacts from this source.

There would be some competition for labor force and materials. Oil and related companies generally offer higher wages than fish processors and municipalities. They have also exhibited willingness to pay a higher price to get materials exactly when and where they need them. This is a luxury small businesses and small towns do not have.

It is conceivable that there could be some short-term shortages of supplies and a less skilled working force because people and transport are totally committed to the oil companies' activities. But, considering the experience gained through OCS sale 39, which used Yakutat and Seward as a support and supply base, and the upper Cook Inlet experience, it is a relatively minor one.

The impact of the unmarketabililty of flavor-tainted fish is another open question. It does happen, but must not be a notable happening because there is seldom a report about it. In all the years of oil activity in Cook Inlet, there has only been one report of one fisherman not being able to sell one load of crab because of flavor tainting. The source of the tainting material is unknown.

Crab and salmon would be the most susceptible to flavor tainting should a hydrocarbon spill occur during the fishing season for these species covering an area where they are fished. Crab pots could be left on the ocean floor until the pollutants drifted away, and could then be pulled through clear water. Some additional expense for either cleaning old buoys and lines, or buying new ones, would be required and would be part of the impact.

Salmon gear (gill nets) would probably need to be replaced should a pollutant event cover them, and whatever salmon were in them would be lost to the market. The chance of impact is thought to be slight, but if it occurs, impact is probable. Damages due to oilspills are covered by the Offshore Oil Pollution Compensation Fund (appendix F). See section I.C. for a discussion of this fund.

The loss of fishing time because of the proposal activities covers a wide range of possibilities. These include but are not limited to time lost because of oil in the water over fishing grounds, gear replacement is slow, boats and gear must be cleaned, and help may not be available.

The labor requirements for the onshore construction projects related to this proposal are expected to have a minor effect on the fishing industry. The construction work force is assumed to primarily consist of transient workers who would be housed at onsite construction camps. The projects would be sufficiently large to attract enough labor to an area so that the fishing industry employees that would be lost could be replaced with new arrivals.

The OCS labor requirements in Homer and Seldovia resulting from this proposed lease sale 60 are not expected to have a significant impact on the commercial fishing industry. OCS labor requirements are not substantial and/or they are matched by projected increases in population. The total supply of labor is expected to increase to meet the OCS labor requirements with margin to spare. The OCS labor requirements in Kodiak are minimal and are not expected to affect the Kodiak commercial fishing industry. There may be some local labor conflicts, mostly in Port Lions, but they should be short lived.

The extent to which OCS uses of ocean space would increase fishing costs in a particular fishery would depend on the extent to which the fishing grounds would be used for OCS operations and on the nature of the fishing and OCS operations in areas of joint use. The potential for conflict for these fisheries is discussed by gear type since gear type is a major determinant of potential conflicts.

The long line halibut fleet operates in lower Cook Inlet. The long line gear is particularly susceptible to losses to OCS survey vessels and other OCS vessels that tow underwater gear or are of great draft. Gear losses are expected to occur and fishing costs are expected to increase.

The crab fisheries use pot gear which is left unattended. The high concentration of the gear in some areas would result in a very high probability that gear losses could occur if other vessels enter the areas. OCS ocean space use would occur in the Kodiak king, tanner, and Dungeness crab grounds. Gear losses, therefore, would be expected to occur in these areas except that the majority of the fishing areas in Shelikof Strait are mostly away from the proposed lease area and, therefore, away from direct conflict areas.

The bottomfish grounds in the proposed area are developing. Since these fishing areas are not clearly defined, impact assessment for these areas is not possible at this time. However, with the possible exception of gear loss due to OCS operations, losses would likely be minimal. By the time the domestic fishery has fully developed, OCS ocean space use would consist primarily of tanker traffic in well established lanes.

Gear loss is expected to be a major part of the increase in fishing costs in areas in which the two industries will compete for ocean space. Although the magnitude of the gear loss resulting from OCS operations cannot be determined, current gear loss in absolute terms or in terms of total fishing costs are of interest. CFEC data indicate that in the mid-1970's, the average gear loss of vessels participating in Alaska shellfish fisheries was approximately $8,400. This was about 13 percent of the total value of the gear used by these vessels, or about 17 percent of the fishing costs excluding labor costs. These gear loss estimates include the cost of gear itself and do not include the cost associated with lost fishing time. The gear losses due to OCS operations could exceed the current losses. Lost fishing time because of gear loss could cost far more than loss of crab gear.

Another aspect of the increased fishing cost is the cost associated with collisions between fishing vessels and OCS vessels or structures. Fishing vessel accident data indicate, for the United States as a whole, collisions account for approximately 18 percent of fishing boat accidents, and 45 percent of the collisions result from neglecting the boating rules. The implication is that additional vessel traffic would not substantially increase the cost of vessel accidents, particularly if more attention is paid to the boating rules.

Conclusion: The proposed sale would have little effect on the Homer, Seldovia, and Kenai commercial fisheries. The exploratory phase may adversely impact the Kodiak and Port Lions commercial fisheries because of competition for labor, and ocean space (seismic boats in crab pot and other fishing areas). These impacts could be severe but would be short-lived.

During production there would be reduced fishing areas (by 8,000± acres) and a possible conflict over travel areas. Experience from other areas (Yakutat and Cook Inlet) has shown that over time (2-5 years) these conflicts can be resolved. Adverse impacts are estimated to be local, short lived, and minor to the commercial fishery as a whole.

Oilspills could adversely affect local populations of commercial fish species and, thus, the commercial fishery.

Cumulative Effects: Should the activities associated with future sales add to the conflicts identified above, adverse impacts could become serious for a time. Deep-water trawling and long-lining also occur. There may also be conflicts with shipping, especially from tanker traffic assumed for sale CI.

Unavoidable Adverse Effects: The commercial fishing industry would probably experience some adverse impacts from this proposal. There would be increased competition for ocean space, labor (short term), and perhaps supplies (again, short term). Some fishing areas could be lost for the life of the project. Some fishing gear and fishing time could be lost as well. Overall, impacts on the commercial fishing industry are estimated to be moderate in the Shelikof Strait area and minor to nonexistent in the Cook Inlet area.

d. Impacts on Marine and Coastal Birds: More than 100 species of marine and coastal birds numbering several million compose a major portion of the marine fauna in the proposed sale area. This avian fauna, especially pelagic birds (alcids) and marine waterfowl, are the most sensitive marine species to hydrocarbon development. Since the turn of the century, acute and chronic hydrocarbon pollution of marine environments has been the major factor contributing to large population reductions along heavily traveled oil tanker routes. Duck populations (old squaw, eiders, and scaup) in the Baltic Sea have decreased by 90 percent in the past forty years, while scoter populations which migrate through the Baltic and North Seas have also been noticeably reduced (Bourne, 1968). Auk and guillemot colonies have been reduced greatly in the vicinity of shipping routes throughout their southern distribution, with localized extermination in enclosed waters, such as the inner English Channel (Bourne, 1968).

An oilspill vulnerability index for marine birds of the northeast Pacific developed by King and Sanger (1979), is based on such characteristics as species range, population, habits, productivity, mortality, and potential exposure to oil pollution. Comparative analysis of species listed in the index supports the conclusion that pelagic species, such as murres, puffins, storm petrels, and marine waterfowl, such as scoters and eiders, are the avian species most vulnerable to oil pollution.

Three of the five major colonial nesting species (common murres, tufted puffins, and fork-tailed storm petrels) and the greater majority of the marine wintering species in the proposed sale area are among the most vulnerable to oil pollution. The direct effects of oil pollution contact on marine birds are well documented. The initial and most critical effect of oil pollution is the loss of feather water repellency. Oiling causes feather filaments to clump together, leaving gaps in the outer feathers which then permit down feathers to absorb water. In turn, the oiled bird loses its thermo-insulation and buoyancy. Such loss is very likely to result in death from hypothermia, shock, or drowning. Approximately 50 to 90 percent of the birds oiled by a spill never reach the beaches; they sink to the ocean bottom (Nelson-Smith, 1973, Ohlendorf, et al., 1978). Thus, oiled birds on the beach probably represent less than half the number of birds killed by an oilspill.

Birds which are only slightly oiled and survive direct oil contact suffer varying degrees of hypothermia, impaired mobility, and other physiological effects which, in addition to indirect effects, may contribute to increased population mortality (Nelson-Smith, 1973).

The most likely indirect effect of oiling on birds is the ingestion of oil while the birds are preening. Oiled birds will instinctively preen their feathers in an attempt to clean them. Oil ingestion is shown to cause various pathological conditions of the kidneys, pancreas, gastrointestinal tract, lungs, and other internal organs (Hartung and Hunt, 1966; Ohlendorf, et al., 1978). Although oil ingestion alone is apparently sublethal, the physiological stress from intoxication and dehydration are significant contributing factors in the deaths of oiled birds, especially those whose feathers have been affected (Ohlendorf, et al., 1978).

An important indirect effect of oil pollution on marine birds and other waterfowl is the probable decrease in reproduction due to oil ingestion, and perhaps more important, the contamination of eggs with oil from the feathers of the parent birds. Reduction of egg laying because of oil ingestion has been reported by Hartung (1965); Ainley, et al. (1979); and Stickel and Dieter (1979). Separate studies indicate oil contamination of eggs significantly increases chick embryo mortality, and decreases nesting success. Stickel and Dieter (1979) showed that very minute quantities of oil (5 microliters) applied to the surface of marine bird eggs caused significant chick embryo mortality under laboratory conditions. Similar chick embryo mortality in gull colonies was demonstrated by Patten and Patten (1978 and 1979), and indicated by Manuwal and Boersma (1977) in field experiments with storm petrels. It is apparent that embryo mortality is caused by toxicity of oil rather than blockage of gas exchange. Both Patten and Patten (1978) and Stickel and Dieter (1979) showed that even small amounts (20 microliters) of weathered oil reduce egg hatching by 50 percent. Oil contamination of nesting birds during the egg incubation period could substantially reduce hatching success for one nesting season. Thus, chronic low level oil pollution near important nesting colonies could effectively reduce productivity and consequently contribute to a possible long term decline in colonial populations.

In addition to the effects of direct contact with oil pollution, marine birds could be adversely affected by reduction and contamination of food sources. A sudden, oilspill-related, local reduction in capelin, euphaussiid crustaceans, or another major food source that occurs during a migration stopover period or during the nesting period could lower reproduction and survival of bird populations that depend on that food source. It is likely that marine birds living in oil-polluted environments may accumulate residues of the relatively persistent aromatic components (Ohlendorf, et al., 1978). These accumulated residues could lead to chronic toxicity in birds and adversely affect their physiology, reproduction, and behavior.

Another major potential cause of adverse effects on marine and coastal birds due to OCS activities is man-made disturbance. The most serious interrelated disturbance problems specifically identifiable in the proposed sale area are increased air and boat traffic near important nesting areas. The effects of aircraft, especially helicopter noise and presence, over nesting colonial birds and nesting waterfowl have been documented. Low flying aircraft passing near bird colonies frighten most or all adult birds off their nest, leaving the eggs and young vulnerable to exposure, predation, and accidental displacement from the nest during hurried departures by adult birds (Jones and Petersen, 1979; Hunt, 1976; and Sowl and Bartonek, 1974). Preliminary evidence has indicated that repeated disturbance could significantly reduce hatching success, fledgling success, and perhaps cause adult abandonment of eggs and young (Gollop, et al., 1972; and Scott, 1976).

Other potential disturbance problems associated with OCS development include possible displacement of birds from important feeding and staging areas due to increased air and boat traffic, and disturbance due to locating onshore facilities near coastal nesting areas.

Gull populations have increased substantially in response to coastal development in the Gulf of Alaska (Patten and Patten, 1979). Such species as glaucous and glaucous-winged gulls have adapted to utilizing human refuse from canneries, processing ships, garbage dumps, and sewer outfalls. Development related wastes have apparently increased the carrying capacity of the environment for these gulls to the apparent detriment of other species. Gulls prey readily on other marine bird eggs and young. The availability of human refuse has probably enabled gulls to increase their numbers and sustain themselves when preferred food sources are absent, thereby increasing the pressure on their preferred prey when available during the nesting season. Unless disposal of human refuse associated with coastal development, including OCS development, is strictly controlled, changes in competition and predation between gulls and other marine birds are likely to occur. Several species of marine birds, such as murres and kittiwakes, may decline markedly while gull populations accelerate. Because of their association with garbage dumps, sewer outfalls, and municipal water supplies along the coast of Alaska, gull species are potential carriers of human bacterial and parasitic diseases, and could be a serious health problem (Patten and Patten 1978 and 1979).

The major adverse impacts from OCS activities in the proposed sale area could come from oil pollution of the marine environment and man-made disturbance. The reader is advised to review preceding discussion regarding the qualitative nature of potential effects of the proposal or the alternatives on birds.

Analysis of the Geological Survey oilspill trajectory model (sec. IV.A.1.d. and appendix D) results indicate four oilspills are likely to occur in the Cook Inlet-Shelikof Strait area during the life of the project. However, the analysis is based on the assumption that commercial resources will be found throughout the sale area. This probability is only 5 percent (see section II.A). Assuming that the mean case commercial deposits are found, the probability that one or more oilspills will occur and contact land within 3 days is 77 percent, and within 30 days is 96 percent (appendix D, table 8). (Note: Unless otherwise specified, spill contact probabilities refer to contact made within 10 days of simulated launch.) Coastal habitat areas on both sides of Shelikof Strait have the highest probability of being contacted by an oilspill within 3 days as shown on table 14, appendix D, table nos. 15 and 45. The Barren Islands and Kamishak Bay-Augustine Island coastal areas are of moderate risk from oilspills contacting land (appendix D, table 14, nos. 53 and 54). The large birds colonies of the Barren Islands could sustain high mortality if an oilspill reached or came near the islands during the nesting season. High density offshore foraging areas (appendix D, fig. D-1) are the most likely targets to be contacted by an oilspill within 3, 10, or 30 days. For example, during the fall-winter season, Shelikof Strait offshore foraging areas have a

57 percent chance of being contacted in 3 days, and a 63 percent probability by oilspills associated with the proposal during the winter (appendix D, table 8). The northern Kachemak Bay foraging area has a slightly greater chance (38%) of being contacted by oil during the spring-summer season within 10 days than during the fall-winter, 36 percent probability (appendix D, table 8). On the other hand, Shelikof Strait foraging areas are more vulnerable during the winter season (63%) than during the spring-summer (54%).

Bird surveys indicate that the western coastal areas of Kodiak-Afognak Islands are important wintering areas for sea-ducks and alcids especially the Whale Passage-Afognak Strait area (Forsell and Gould, 1980; Trapp, 1979). Oilspills that occur in Shelikof Strait could have major impacts on these populations. The inner bay wintering areas could not be analyzed in the trajectory model. However, if an oilspill occurs along the proposed pipeline route in Kupreanof Strait or if a tanker spill occurs near the proposed Talnik Point tanker facility near Whale Passage, it is very likely that major impacts on marine bird populations in this most important concentration area could occur. The trajectory analysis does not include potential spill points within Marmot Bay or Kupreanof Strait. Kachemak Bay nearshore areas and the inner bay have a very low chance (1%) of being contacted by an oilspill within 30 days (appendix D, table 14, nos. 76, 77, and 78, fig. 5). However, the Anchor Point (land segment 75) area has a higher chance (8%) of being contacted by an oilspill. This probability increases to 45 percent with the addition of the present lease area and existing tanker terminal and transportanker activity in that area (appendix D, table 21, no. 75).

Kamishak Bay-Augustine Island nearshore areas have a fairly high probability of being contacted by an oilspill (appendix D, table 8, and fig. D-2, area H). Migratory bird populations that stage in this area could be directly affected during spring and fall migration periods.

Coastal habitat areas that show the highest probability of being hit by an oilspill include the eastern side of Shelikof Strait from Kupreanof Strait north to Malina Bay, including the western side of Raspberry Island (table 14, appendix D, nos. 14 and 15), and on the western side of Shelikof Strait from Kinak Bay north to Kukak Bay (appendix D, table 14, no. 45 and fig. 5). Western Raspberry Island-Kupreanof Strait has a 23 percent probability of being hit within 10 days while Kinak-Kukak Bay Area has a 31 percent probability (appendix D, table 14, nos. 14 and 15). The highest probability among shoreline segments in lower Cook Inlet is 12 percent for Kamishak Bay (appendix D, table 54). These data indicate that coastal habitats within Shelikof Straits show higher risk to oil spills than lower Cook Inlet tracts because of the proposed action.

In summary, assuming that commerciable oil is found, sensitive marine bird populations that occur in the proposed sale area would be at high risk (greater than 20% probability of large populations being contacted by an oilspill) from oil and gas development throughout the proposed lease area.

Large nesting colonies of vulnerable species on the Barren Islands may be severely affected by oilspills that reach the islands or occur within important offshore concentration areas. Tens of thousands of shearwaters that concentrate in the northern foraging area (fig. D-1) could also be adversely affected directly and indirectly by an oilspill. Highly vulnerable sea ducks and alcids that winter in the Shelikof Strait are likely to suffer major impacts (25 to 75% mortality of a species population) from an oilspill in the Shelikof tract area, especially during the winter and fall.

If a major oilspill occurs in the Kupreanof Strait or Whale Passage areas, major impacts (25 to 75% mortality of a species population) to marine birds are very likely to occur, since this area is a very important year-round concentration area in the Kodiak-lower Cook Inlet region.

Chronic small oilspills are the most likely spills and inevitable in occurrence to a certain degree. Such spills are most likely to be a problem near shore facilities and along tanker routes. Even small quantities of chronic oil discharges in addition to accidental discharges, if they occur in an important marine bird concentration area, could have a detrimental effect on marine birds that utilize the area.

Disturbance from air and boat traffic and human presence are potential threats to colony nesting birds, other nesting birds, and apparently to a lesser extent, staging and foraging birds. Numerous sea bird colonies along the coast of the proposed sale area could be affected by increase air and boat traffic during OCS development activities. Large colonies on the Barren Islands, Gull Island near Chinita Bay, Flat Island south of Kachemak Bay, Chisik Island colonies, and other bird colonies in the area could be subject to additional air traffic from OCS support activites perhaps which may lead to reduced productivity and population reductions from disturbance. The responsive increase in gull populations to human development and to associated increases in waste and garbage disposal sites could have a significant adverse effect (greater than 20% long term population reduction) on other marine bird species.

The greatest risk to coastal bird habitats due to oilspills is within Shelikof Strait. The overall probabilities for oilspills reaching coastal habitats throughout the proposed sale area is 77 percent within 3 days increasing to 96 percent within 30 days (appendix D, table 8). Projected marine bird offshore foraging areas in the Shelikof Strait show a greater risk from the proposal than the projected lower Cook Inlet foraging area. The former foraging areas are at a higher risk during the fall and winter while the latter foraging area is at a slightly higher risk during the spring-summer. The Kupreanof Strait-Raspberry Island western coast and the Kinak Bay-Kukak Bay area on the western side of the Shelikof Strait are coastal habitats of greatest risk from an oilspill within the proposed lease area.

Conclusion: If commercial finds of oil occur within the proposed lease area and if a major spill occurs, marine and coastal birds could be severely affected. Depending on the location, size, and season of the spill, thousands and perhaps several hundred thousand birds could be directly killed by a large oilspill. Chronic oilspills could reduce bird populations over the life of the project. Noise and other human disturbances of nesting birds could have an additional degradation effect on several species populations. The proposal could have a major impact on marine bird populations within the lower Cook Inlet-Shelikof Strait and Kodiak areas. Vulnerable species could take as long as 50 years to recover from a single 50 percent mortality event depending on the status of the population and potential recruitment from adjacent areas.

Cumulative Effects: The oilspill analysis projects the most likely number of spills to be 7 from existing hydrocarbon development activities in the area, increasing to 11 spills with the proposal provided that oil is found throughout the sale area. The combined effect of the proposal with existing hydrocarbon development already occurring within the Cook Inlet significantly increases the risk of oilspills occurring within the lower Cook region. For example, the Kachemak-Barren Island offshore foraging habitat probability of being contacted by an oilspill increases from 38 percent during the nesting season with proposal to 86 percent (the proposal and existing lower Cook Inlet OCS lease sale, appendix D, table 8). The addition of existing tankering activities increases this probability to 95 percent, (appendix D, table 21). The probability of the Barren Islands being hit by one or more oilspills increases from 14 percent (the proposal) to 46 percent (the proposed plus the existing lease area, appendix D, table 8), and would increase to 58 percent when including existing tankering activities, (appendix D, table 21). Coastal areas such as Kamishak Bay, Anchor Point, and Augustine Island are also at high risk from the potential cumulative effects of the proposal, existing lease area, and existing tankering in the area. For example, the probability of an oilspill contacting Bruin Bay increases from 12 percent with the proposal to 55 percent when combined with existing hydrocarbon activity projected risks, (appendix D, fig. IV.A.d.-15, table 21, no. 54). Within Shelikof Strait, cumulative risks to coastal habitats and to marine bird foraging areas, significantly increases. For example, coastal habitats on the western side of Shuyak Island from Dark Passage south to Black Cape on the northwestern coast of Afognak Island spill contact probability would increase from 15 percent (the proposal) to 29 percent when combined with existing hydrocarbon activity projected risks, (appendix D, table 21, no. 17). In the Uganik Island area, from Kupreanof Straits south to Uganik Bay oilspill contact probability increase from 9 percent (the proposal) to 21 percent when combined with existing hydrocarbon activity projected risks (appendix D, table 21, no. 14). Several bird colonies and important winter concentration sites have been identified in the above coastal areas. For projected seabird foraging areas in Shelikof Strait, oilspill contact probability would increase from 63 percent (the proposal) to 88 percent when combined with existing hydrocarbon activity projected risks during the fall-winter period. Risk from oilspills increases dramatically during spring and summer for Shelikof Strait foraging areas. When comparing existing tankering, risks increase 8 percent (appendix D, table 23); when comparing with the proposal, risks increase 54 percent (appendix D, table 8).

Other planned development projects in the region (see sec..IV.A.1.h) could increase the risk of adverse impacts on marine and coastal birds. Development of the Beluga Coal field could increase marine traffic in Cook Inlet; thereby increasing the risk of tanker accidents and perhaps increasing disturbance of coastal habitats and marine bird populations. Development of the Pacific LNG facility at Nikiski will inevitably increase tanker traffic in lower Cook Inlet; thereby increasing the probability of tanker accidents and increasing the risks of adverse impacts on bird populations. The proposed State lease sale 35 could further increase the risks of major impacts on birds and their coastal habitats in lower Cook Inlet especially for lease areas adjacent to important shoreline habitat.

In conclusion, the cumulative effects of the proposed action, existing hydrocarbon activity, and planned development projects could increase the risk of adverse impacts on marine and coastal birds by 50 percent or more. The probabilities of potential impacts increase significantly when comparing the proposal with existing hydrocarbon activities. However, these probabilities are partially based on the assumption that hydrocarbons will be found within both the existing and proposed sale areas, and thus, the probabilities could be an overestimate of the cumulative risks. Inevitably, the proposal when combined with existing State hydrocarbon activities and other air and marine traffic will increase the chances of significant impacts on marine and coastal bird populations.

Unavoidable Adverse Effects: The proposed action would cause increased hydrocarbon activities and related marine and air traffic within lower Cook Inlet and Shelikof Strait. The frequency of permitted hydrocarbon discharges and accidental spills would likely increase.

Encounters between marine birds and minor spills could contribute to some bird mortality. Increases in marine and air traffic would unavoidably cause disturbance of some marine and coastal birds. Coastal habitats would be unavoidably disturbed, perhaps reducing utilization of these areas by some species.

In conclusion, the proposed action could result in mortality of and disturbance to some marine and coastal birds. Vulnerable species could be expected to suffer population decreases for an indefinite period of time.

e. Impacts on Marine Mammals (Fur seal, sea lion, harbor seal, sea otter): This section presents an overview of potential impacts on fur seals, harbor seals, sea lions, and sea otters. Cetaceans and endangered species are treated in section IV.A.2.f. Oil pollution and disturbance due to increased human activity could affect marine mammal populations native to the proposed sale 60 area. Other potential impact-producing agents which could be associated with petroleum development and production include marine disposal of drilling muds and cuttings, marine disposal of formation and cooling waters, dredging and filling (such as that associated with pipeline construction), and secondary development. It is not possible to accurately predict on a long-term basis how interaction of these major variables may affect each mammalian species found in or near the proposed sale area. However, available information can at least broadly define possible effects and help to identify those species most sensitive to various perturbations, particularly those effects observable on a short-term basis.

Short-Term Direct Oilspill Effects: Direct (and indirect) effects of spilled oil would vary depending on the population density and physiological status of the affected mammal species, season and meteorological conditions, chemical or physical characteristics of the spill, duration of exposure, type of exposure (e.g., ingestion versus external contact), and other factors. An effect which is often thought to be associated with spilled petroleum products is direct mortality to marine mammals due to acute contact, such as what may occur when individual organisms are coated by spilled oil. Evaluations of observed marine mammal contact with spilled oil or of potential contact, such as the 1969 Santa Barbara blowout, have been limited as to the extent of direct mortality on affected species. Studies suggest that for certain species, direct mortality as a result of contact with spilled oil may not be an immediate result. LeBoeuf (1971), who evaluated effects of the Santa Barbara spill, concluded, "the crude oil which coated many weaned elephant seals at

San Miguel Island in March and April had no significant immediate nor long-term (1-15 months later) deleterious effect on their health. Had the rookery been contaminated earlier in the season when females were nursing, pups might have ingested the crude oil and more serious consequences might have ensued." Brownell and LeBoeuf (1971) concluded that crude oil contamination of California sea lion rookeries on San Miguel Island due to the same spill did not have a significant effect on pup mortality. Davis and Anderson (1976), reported no significant difference in the mortality of oiled and unoiled grey seal pups found in surveys of polluted beaches in England. On the other hand, species such as sea otters or fur seals may be particularly sensitive to oil contact. These species rely on their fur for insulation as opposed to other species which minimize heat loss with a layer of blubber. Kooyman and Costa (1978) found that the metabolic rate of a sea otter increased 22 percent after oiling of one-third of the dorsal surface with only 38 milliliters of crude oil. Other experiments by the latter authors indicated that oiled sea otters demonstrated increased metabolic rates to 1.4 times the normal rate. These effects were observed in some cases to last a few days to 2 weeks, but it was concluded that after repeated oiling, return to normal metabolic rates may be impossible. Thus, exposure of sea otters to crude oil in natural environments "would probably cause significant thermal stress and could lead to hypothermy and/or pneumonia resulting in death," (Kooyman and Costa, 1978). Kooyman, et al., (1976) found that thermal conductance of oiled fur seal pelts increased from 1.4 to 2.0 times that of unoiled pelts. They concluded, "Any contact with oil at any time of year would have a profound influence on the health of individual northern fur seals through increases in pelt conductance with concommitant increases in metabolic rate. That death would inevitably follow such contact cannot be verified from the present effort. However, considering that 1) oiled animals have greatly increased maintenance costs, and 2) they are extremely reluctant to enter sea water (where their food is found), it is clear that the health of oiled animals would be in serious jeopardy." (Kooyman, et al., 1976.)

Therefore, direct mortality from oiling as a result of short-term effects on animal heat dynamics would be most likely to occur for sea otters and fur seals as compared to sea lions or seals. However, ultimate responses of local populations to direct exposure to oil pollution will vary depending on such factors as species productivity, population status at the time of a spill or spills, other sources of mortality, changes in species distribution, and/or unrelated changes in habitat quality.

Response to acute contact with oil by certain marine mammals may be manifested by a variety of apparently non-lethal physiological effects. Geraci and Smith (1976) found that ringed seals immersed in crude oil for 24 hours suffered transient eye problems, and minor kidney and, possibly, liver lesions, but could detect no permanent damage. The same workers found that harp seals fed 75 milliliters of crude oil suffered no significant effects. Geraci and St. Aubin (1979), in review of the latter research, considered the dosage used as "substantial," but that the pathological changes could have been induced by administration at higher but "unrealistic" levels. Geraci and Smith (1977), concluded that seals are not known to be carrion feeders and any oil that they might consume from live prey would be negligible. Also, Geraci and St. Aubin (1979), concluded that their experiment exposed ringed seals to gaseous volatile hydrocarbons at concentrations higher than would be encountered as a result of an oceanic spill, yet no associated lung pathology could be detected.

Davis and Anderson (1976), detected a lower mean weight of oiled grey seal pups as compared to unoiled pups in their field analysis, but could not attribute the difference to the effects of oil alone. Engelhardt, et al. (1977) showed that petroleum hydrocarbons are absorbed by ringed seals exposed by both immersion (absorption during immersion probably via skin or respiratory surfaces) and ingestion. Apparently liver and renal functions of this species serve to excrete and/or detoxify hydrocarbons absorbed during short-term exposure. It is likely that other seals and marine mammals have similar excretory and/or detoxifying mechanisms. However, the efficiency of detoxification and excretion under conditions of maintained, long-term exposure is unknown.

It can be concluded, therefore, that short-term exposure of certain phocid seals (such as ringed and, probably, harbor seals) may yield relatively minor physiological effects such as eye irritation or non-permanent kidney and liver injury. Behavioral effects are not well understood, but for the few species studied such as fur seals and sea otters, increases in grooming behavior are likely (Geraci and St. Aubin, 1979). As observed in ringed seals (Geraci and Smith, 1976), increased aggression and irritability may also result. Since field observations of sea lions suggest that scent is important in recognition of pups by females, it is possible that coating of animals or other contact with oil could inhibit such recognition and lead to pup abandonment and starvation (Schneider, 1980; Alaska Department of Fish and Game, personal communication, 1980). For many species, baseline behavioral studies are lacking; and for the species present in lower Cook Inlet and Shelikof Strait, little information exists which may serve to predict behavioral response to oilspills or how such response would ultimately impact population trends and/or structure.

Long-Term and Chronic Direct Effects: It is likely that longer exposure or repeated exposure of marine mammals to spilled oil could result in more significant physiological effects than those discussed above, particularly in terms of irritation of eyes, liver tissue, or degradation of pelage (especially for sea otters and fur seals).

The ultimate direct effects of low-level chronic oil contact on marine mammals are not readily predictable. In fact, it has been suggested that long-term effects can only be assessed under field conditions (Geraci and St. Aubin, 1979), primarily through monitoring efforts. One possible result of low-level or chronic pollution would be to contribute to physiological stress on marine mammal populations which may be at or near carrying capacity. Some writers, such as Geraci and Smith (1977) have suggested that oil contact may trigger death in stressed seals. Stress in wild mammal populations (characterized by decreased reproduction, decreased resistance to disease, and increased mortality) may be induced by a complex of factors related to population density, social interaction, nutritional factors, genetic changes, climate, and a host of other environmental influences. The relative importance of stress-related factors suspected of causing changes in wild microtine rodent populations has been studied and debated for years (Christian, et al., 1965; Christian, 1971; Batzli, 1970; Keller and Krebs, 1970; Selye, 1973; and Terman, 1965). From this and similar research with other mammalian species, it can be concluded that responses of wildlife populations to individual stressors is extremely varied, and the extent to which chronic oil pollution would contribute to physiological stress and thereby affect marine mammal populations is also variable. Populations or individual wild animals which appear to be under stress associated with density, habitat deterioration, or reduced food availability, may respond to interactions of these factors with chronic, low level oil contact.

There is little, if any, evidence that sea lions, sea otters, fur seals, or harbor seals in the Cook Inlet area are currently or generally susceptible to major stress-mediated responses to chronic or low-level oil spillage. Localized sea otter populations at or near carrying capacity may demonstrate responses of indeterminant nature and extent.

Indirect Effects of Oil Pollution: Indirect effects of oil pollution on marine mammals would be those associated with destruction and contamination of food sources, or essential habitat. Species most susceptible would be those which rely on a restricted or sedentary food source (such as the sea otter), or those with a behavioral sensitivity to habitats which have been contacted by oil. Sea otter populations are limited to a significant extent by food availability. Therefore, changes in food supply caused by oilspills could be of major consequence to sea otters in lower Cook Inlet and Shelikof Strait. Marine mammal species which feed on pelagic fish (such as sea lions, fur seals, and harbor seals) are probably less sensitive to localized loss of food sources.

Available information regarding potential behavioral-induced exclusion of marine mammals from habitats which have been oiled is not extensive. Observations recorded in the literature reviewed under Short-Term Direct Oilspill Effects suggest that certain species are not particularly sensitive or responsive behaviorally to the presence of oil on rookeries.

Other indirect effects of oilspills on marine mammals include possible bioaccumulation of hydrocarbons and petroleum-derived compounds. According to Risebrough (1978), little is known about pathways of possible accumulation and virtually nothing is known of their persistence in marine mammals. Neff (1979) in a review of literature on toxicity and ecological effects of marine disposal of drilling muds, concluded that heavy metals associated with used drilling muds are of relatively low acute toxicity, have a very limited bioavailability, and therefore have little potential for accumulation in marine mammals if disposed of at sea. Certain species of seals are suspected of having abilities to detoxify methyl mercury obtained through ingestion, and sea otters may have an inherent mechanism which protects them from the effects of cadmium (Risebrough, 1978). Natural and background levels of heavy metals, chlorinated hydrocarbons, and other toxic substance in the marine environment (or marine mammal tissues) would make it extremely difficult to evaluate the effects of bioaccumulation of petroleum-related hydrocarbons on marine mammals. At present, accumulated chlorinated hydrocarbons (e.g., DDT) from industrial or agricultural sources have been the most important factors affecting California sea lions, ringed seals, and harbor seals (Risebrough, 1978).

Noise and Disturbance: Human disturbance related to oil and gas support activities during both the exploratory and development stages, especially air traffic near pupping grounds (such as Augustine Island) could have significant adverse effects on harbor seals (Pitcher and Calkins, 1977, 1979). Noise-related disturbance from low flying aircraft, especially helicopters, could cause mass and rapid exodus of adult seals from rookeries and hauling areas. If this occurred during the pupping season (mid-May through mid-July), pup mortality would occur from trampling or abandonment of pups. Pups deserted on the beach during such a disturbance may not be recognized by the mother when hauling out reoccurs. Harbor seals may also be sensitive to disturbance during their molting period from mid-August to mid-October (Pitcher and Calkins, 1977; 1979). Effects of disturbance due to underwater noise (e.g., vessel engines, seismic operations) on seals, sea lions, or sea otters are possible but their extent is unknown.

Disturbance of thousands of sea lions during the pupping and breeding seasons (May-July) at important hauling grounds on Sugarloaf or Marmot Island could have an adverse effect on sea lion populations. Frequent aircraft or boat traffic near the islands could cause disturbance of sea lions during the pupping season and could cause increased pup mortality and abandonment of important breeding and pupping grounds (Pitcher and Calkins, 1977, 1979).

Populations of other species endemic to the lower Cook Inlet and Shelikof Strait area (e.g., fur seal and sea otters) are probably not as susceptible to effects of noise and disturbance as are sea lions and harbor seals because the former species are more widely dispersed and/or do not utilize rookeries in the sale 60 area. Although localized response to disturbance is possible for fur seals and sea otters, effects of noise and disturbance on reproductive success or mortality rates of populations at large are probably of minor importance.

Natural Gas and Gas Condensates: Currents, wave action, and wind would be expected to disperse, dilute, and evaporate gas and gas condensate pollutants rapidly. However, animals in the immediate vicinity of a gas leak may be affected at the occurrence or shortly after a leak would occur. Inhalation of toxic vapors may be fatal to marine mammals (depending on degree of exposure). Such effects are relatively unlikely to occur to an extent significant enough to affect the overall status of local marine mammal populations. Pipeline burial, which may temporarily increase benthic fauna that attract marine mammals (especially sea otters or harbor seals), would increase such risks to individual animals.

Other Impacts: Hamilton, et al., (1979) reviewed other impact-producing agents which may be associated with oil and gas exploration and development. Factors which may affect marine mammals include marine disposal of formation waters or cooling waters, shoreline alteration, facility siting, physical presence of offshore structures, dredging and filling, and secondary development. The extent of such impacts is most readily assessed in localized or short-term analysis and projections. During exploratory phases of the proposed sale, most of these impacts on marine mammals are not expected to be significant unless noted otherwise below. Of major concern would be permanent loss of habitats as the result of facility siting and secondary development associated with development phases. Existing legislative constraints and permitting procedures may serve to minimize localized impacts. Long-term and aggregate effects of such factors are treated under "Cumulative Effects."

The Barren Islands, Marmot Island, and possibly the Puale Bay area would be locations where direct effects of spilled oil on sea lions would be most substantial if animals are contacted, assuming spilled oil induced behavioral responses such as rookery abandonment, pup desertion, or caused direct mortality. Oilspill risk analyses show that the Barren Islands area (including Sugarloaf

Island) (appendix D, table 8, Area C) has a moderate (11%) chance of spill contact over the life of the field due to spills associated with the proposal. (Note: Unless otherwise specified, oilspill risk analyses made in this section will refer to probabilities conditional on the development of a production field and to spill contact rates within 10 days of simulated launch.) Of the Barren Islands, Ushagat Island, an area noted for at least three sea lion hauling areas (used by 1,000-2,000 animals), is at highest risk with a probability of spill contact of 6 percent due to the proposed sale (appendix D, table 14, No. 81). Latax Rock just north of Shuyak Island is known to receive use by at least 1,000-3,000 sea lions and would be subjected to a moderate (15%) spill risk (appendix D, table 14, No. 17). However, Sugarloaf Island (used by as many as 10,000 sea lions) has a low (less than 2 percent) probability of spill contact over the life of the field (appendix D, table 14, No. 82), although areas surrounding the island have an 11 percent chance of spill content. Marmot Island and Puale Bay shores also are shown (appendix D, table 14, Nos. 22 and 41, respectively) as having low probability of spill contact over the life of the field. Therefore, direct effects of spilled oil on sea lion rookeries on Sugarloaf and Marmot Islands seem relatively unlikely as a result of the proposal. Indirect effects on these rookeries are somewhat more likely. Due to known mobility of sea lions, however, it is possible that large concentrations could occur in areas of higher risk. Offshore areas in Shelikof Strait also are known to receive heavy use by sea lions (e.g., the feeding area near Puale Bay) and are probably at a higher risk than that reflected by the above-mentioned land segments. Also, probabilities of spills from the proposal affecting areas surrounding certain shorelines are high (e.g., north-northwestern Kodiak Archipelago (area D), 48 percent chance of contact, appendix D, table 8), suggesting that indirect effects on food sources are likely. As discussed in section IV.A.2.f., results of Dames and Moore (1980) indicated that movement of spills originating in lower Cook Inlet will be confined primarily to lower Cook Inlet and/or Shelikof Strait. Therefore, spills in lower Cook Inlet from the proposed sale will pose less threat of oil contamination of important sea lion feeding areas in the Gulf of Alaska, such as Portlock Bank, than they would to feeding areas in the confines of lower Cook Inlet. However, chronic spills in the Marmot Bay area associated with a tanker facility could affect the Marmot Island sea lion rookery, at least indirectly.

Harbor seal concentration areas on land segments of Shuyak Island and north Afognak Island show low to high probabilities of spill contact (appendix D, table 14, nos. 15-22), but the overall nearshore area, including marine habitats of the entire north and northwestern Kodiak Archipelago (appendix D, table 8, area D) has a high probability of spill contact over the life of the field as a result of the proposal. Tugidak Island, an area supporting at least 13,000 harbor seals, is shown to have a very low probability of contact by spills as the result of the proposed sale. Other concentration areas in Shelikof Strait, Alinchak Bay, Puale Bay, and Wide Bay show low probability of spill contact (appendix D, table 14, Nos. 38 and 41). Shorelines in the vicinity of Seal Island and Perenosa Bay, an area identified as a harbor seal pupping area, were found to be at low risk (0-1%) of spill contact (appendix D, table 14, nos. 19 and 20). Augustine Island, another pupping area, is shown as having low probability of spill contact (9% chance, appendix D, table 14, no. 56), but the general Kamishak Bay area was shown to be under high risk (appendix D, table 8, area H) suggesting that direct effects of oilspills on Augustine Island rookeries may be of low probability, but indirect effects such as reduced habitat quality associated with chronic spills in surrounding areas are of high probability. The most probable zone of impact on fur seal concentrations would be the Portlock Bank area, on a seasonal basis. Therefore, impacts of oilspills on northern fur seals as a result of the proposal would have low probability due to the likely general confinement of spills to lower Cook Inlet and Shelikof Strait.

Of the four marine mammal species discussed in this section, the sea otter is probably the species most likely to sustain measurable negative direct effects in the event of spill occurrence. This conclusion is based on the relative abundance of sea otters in the area in conjunction with their known sensitivity to oil contact. Oilspill risk analyses show the north and northwest Kodiak Archipelago and Kamishak Bay sea otter habitats as having high probabilities of spill contact (appendix D, table 8, areas D and H). Spills in Kamishak Bay probably would result in at least partial mortality of resident populations, which total at least 500 to 1,000 animals. Mortality of adults and pups could be expected to be particularly high in the northern Kodiak Archipelago area, a population totaling at least 3,000 and possibly as high as 6,000 animals. Population recovery time for spill-related kills would vary depending on the extent benthic food sources would be destroyed. High mortality would also affect patterns of range expansion (see graphic 11). Occupied sea otter habitats which will be subjected to moderate probability of spills as the result of the proposal include the Barren Islands, western Shelikof Strait, and Anchor Point (appendix D, table 8, area C, E, and G, respectively). Approximately 200 to 400 sea otters could be affected in the Barren Islands. The southwestern tip of the Kenai Peninsula, eastern Kenai Peninsula, and Trinity Island-Chirikof Island sea otter habitats are under low or virtually no spill risk (appendix D, table 8, areas A, B, and F, respectively).

The proposal may subject harbor seals and sea lions to the effects of surface or underwater disturbance, particularly that which may be associated with aircraft overflights or vessel traffic in the vicinity of rookeries or hauling areas (see previous discussion). Also, industrial use of existing marine technologies, such as surface effects craft, could cause future disturbance-associated effects in marine mammals. The extent to which such technologies or deleterious aircraft flight patterns would develop in the proposed sale 60 area is uncertain at this time. Localized disturbance or habitat loss of harbor seals could occur if facilities such as tanker terminals are built near concentration areas illustrated on graphic 11. Therefore, it is possible, if not likely, that noise and disturbance associated with exploration, development, and production phases will directly impact sea lions and/or harbor seals in the proposed sale area.

Indirect effects of the proposed sale would most likely be associated with quantitative or qualitative changes in food sources of marine mammals. Ultimate population response to such effects are unknown, but populations would be expected to be lower. Probably the greatest effect would be demonstrated by localized sea otter populations, and in direct proportion to the above discussed oilspill risk analyses. Those areas inhabited by sea otters with highest risk of spill contact will be most likely to show indirect effects. Local reduction of fish populations (e.g., pollock) could impact sea lions or harbor seals also.

Conclusion: Sea otter populations, particularly those of the northern Kodiak Archipelago, are likely to sustain direct mortality and indirect effects due to oilspills resulting from the proposed sale, assuming the field goes into the production phase. Harbor seals, particularly those of Kamishak Bay and the Shuyak-Afognak Islands, also are likely to be subjected to direct and indirect effects of spills. Major sea lion concentration areas are at low to moderate risk of spill contact over the life of a production field, but surrounding areas are under higher risk and, therefore, it is likely that sea lions will be affected, at least indirectly. Probable sea lion feeding areas in Shelikof Strait, such as offshore sites near Puale Bay, would be located where direct or indirect effects could be acute. Cumulative spill probabilities (see below) for known habitats of sea otters, harbor seals, and sea lions are high in both lower Cook Inlet and Shelikof Strait habitats. This further indicates the likelihood that marine mammals will be affected directly or indirectly in this area if the field goes into production. Siting of tanker facilities on eastern Kodiak Island will increase the risk of localized effects on marine mammals of the Marmot Bay area and marine mammal habitats of Portlock Bank. It is possible that the noise and disturbance associated with exploration, development, and production phases of the proposed sale, will directly impact sea lions and/or harbor seals.

Cumulative Effects: Different projects together could have a summation of effects on marine mammals due to aggregate oilspills, noise, or habitat destruction which would exceed that expected of any individual project. For the purpose of this discussion, "cumulative effects" refer to the sum of direct and indirect oilspill effects (e.g., direct mortality, reduction of food sources), disturbance effects, and other types of environmental degradation which may reduce marine mammal habitat quantity or quality. Such effects are assumed to be similar qualitatively to those discussed previously in section IV.A.2.e. Appendix D, table 8, shows that cumulative (proposed sale 60 plus existing lease area) oilspill contact with the marine mammal habitats of eastern Kenai Peninsula, the Barren Islands, and the north-northwestern Kodiak Archipelago has very high probability (areas B, C, and D, respectively) as well as high probable contact with marine mammal habitats in the vicinity of Anchor Point, the southwestern Kenai Peninsula, Kamishak Bay-Augustine Island, and western Shelikof Strait (areas G, A, H, and E, respectively). Sugarloaf Island shorelines show a medium (11%) cumulative spill contact probability (appendix D, table 14, no. 82). Appendix D, table 14 shows shorelines in the vicinity of Uyak Bay north to Uganik Bay (appendix D, table 14, nos. 12, 13, 14) as having low to high cumulative probability of spill contact as compared to low to moderate probabilities for the proposed sale alone. Probable spill contact is high (23%) in the vicinity of Capes Ugat and Uganik. In western Shelikof Strait, Cape Gull has high probability of cumulative spill contact, and Takli Island Rock has medium probability of cumulative spill contact (appendix D, table 14, nos. 45 and 44, respectively). Puale Bay (appendix D, table 14, no. 41) is shown as being subjected to low cumulative probability of spill contact. Tables 23 and 25 show that existing tankering is presently subjecting certain marine mammal habitats in the sale area to substantial risk of spill contact. Tables 20 and 21 show that the cumulative probabilities of the existing lease sale, proposed sale, and existing tankering could be very high for the eastern Kenai Peninsula, the Barren Islands, the northern Kodiak Archipelago, the Kalgin Island area and the shores of Kennedy Entrance. The areas mentioned immediately above are known habitat of sea otter (eastern Kenai Peninsula, Barren Islands, north-northwestern Kodiak Archipelago, Anchor

Point, southwestern Kenai Peninsula, and Kamishak Bay-Augustine Island), locales of sea lion concentrations (Barren Islands, northern Kodiak Archipelago, Cape Ugat, Cape Gull, Takli Island Rock, and Puale Bay), and harbor seal hauling areas (many areas mentioned above, especially the Kamishak Bay-Augustine Island vicinity and Afognak-Shuyak Island areas).

It can be concluded that direct mortality of sea otters associated with cumulative spills resulting from the proposed sale and existing lease sale are highly likely, and that oilspill-induced indirect effects through reduced habitat quality and/or population productivity may also occur. Cumulative spill rates are high enough in the northern Kodiak Archipelago to reasonably conclude that long-term reduction of inter-tidal benthic invertebrate standing crops are likely, and therefore may lead to reduced carrying capacity of the area for sea otters. Similar effects on harbor seals as the result of cumulative spills may occur, as well as for sea lions. Of particular concern is the apparent moderate cumulative vulnerability of Sugarloaf Island to spill contact indicating that a major sea lion concentration in the area could be affected, at least indirectly, by chronic oil contamination. An example of a possible effect would be lowered reproductive success due to long-term or population-wide changes in animal behavior or physiological conditions induced by chronic spills. Whether such a response would occur in sea lions of the area is speculative at this time. Exposure of the Marmot Island sea lion rookery to chronic cumulative hydrocarbon pollution which might be associated with future development of a tanker facility at Talnik Point and of proposed sale 61 (east of Kodiak Island) could compound undesirable sea lion population responses. Also, movement of tankers over the Portlock Banks to Marmot Bay probably would increase risks to the banks, an important feeding area for sea lions. It is uncertain how the proposed sale would contribute to cumulative effects of hydrocarbon pollution from non-petroleum industry sources (e.g., urban runoff, general marine shipping), but such sources may be relatively minor compared to spills projected for the proposed and existing sales.

Due to the relatively low importance of lower Cook Inlet and Shelikof Strait to northern fur seals, cumulative oilspill effects as a result of the proposed sale, plus the existing sale, are not expected to be great in the sale 60 area proper; nor are effects of the proposed sale expected to contribute significantly to whatever cumulative oilspill effects or disturbance may result from other lease sales (e.g., sale 55) in the range of this species. However, this alternative does pose oilspill risks to fur seals utilizing the Portlock Banks which probably would not be incurred over Alternatives IV or V. Sea lions, which also range far from the proposed sale area, may be impacted by other OCS lease sales. Since the proposed sale is relatively close to major sea lion production areas, its impacts are probably of greatest potential influence on this species. Other lease sales may also affect harbor seals and sea otters. However, it is unknown whether the population-wide response of these species would ever be attributable to cumulative outer continental shelf exploration and development.

Levels and effects of cumulative disturbance associated with the proposal and other potential projects (sec. IV.A.1.g.) on fur seals, sea lions, sea otters, or harbor seals are unknown. Harbor seal and sea lion sensitivity to noise and disturbance suggest that cumulative pup mortality or rookery abandonment could be higher as a result of proposed sale 60 plus the existing CI sale than would be expected from either project alone. Effects of noise and disturbance (including chronic noise) from non-petroleum industry sources (e.g., expansion of recreational boating/aircraft use) may contribute to overall disturbance, but the future extent of such perturbations is unknown. Cumulative effects of expansion of harbor facilities at Homer and increased marine shipping due to the Beluga Coal Field project, may be more significantly disturbing influences than activity associated with petroleum exploration and development. Siting of tanker facilities near harbor seal hauling areas, particularly on the eastern side of Kodiak Island, may add or lead to future disturbance associated with development of proposed sale 61. Also, potential cumulative disturbance of the major sea lion rookery on Marmot Island or contamination of feeding areas of the Portlock Banks may occur if tanker facilities are sited as proposed.

Indirect cumulative food source-related changes in habitat quality resulting from the proposed sale, other sales, and other listed projects (sec. IV.A.1.g.) may impact marine mammals. The ultimate effect of these or non-oilspill indirect impacts (e.g., cumulative loss of habitat to industrial sites) are unknown, but could possibly lead to lower standing crops and productivity of mammalian populations.

Unavoidable Adverse Effects: It is very likely that sea otter populations will sustain some mortality as a direct result of spills associated with the proposed lease sale. Due to the high probability of spills in certain areas, it is likely that habitat deterioration and/or food source loss will occur, at least on a localized basis for sea otters and harbor seals in lower Cook Inlet, Shelikof Strait, and possibly east of Kodiak Island (as may be associated with tankering over Portlock Bank to Marmot Bay). It is possible, if not likely, that unavoidable disturbances of sea lion or harbor seal concentrations will occur as a result of long-term changes in transportation systems, localized impacts of facility construction, or localized short-term effects of aircraft/boat noise. The Information to Lessee recommending that the lessee operate aircraft and vessels no closer than 1 mile from observed wildlife or known wildlife concentration areas would help to minimize behavioral disturbance of a short-term, localized nature, especially at hauling areas and breeding rookeries.

f. Impacts on Endangered Species and Non-Endangered Cetaceans: Major impact-producing agents affecting endangered and non-endangered cetaceans could be oil and gas pollution, noise or other disturbance, and/or habitat losses.

Direct and Indirect Effects of Oil and Gas Pollution: There is no evidence that cetaceans are able to detect hydrocarbon pollution. Accounts from past oilspills show that marine mammals such as seals and sea lions may not avoid oil; however, there has yet to be found a confirmed case of a whale, dolphin, or porpoise found coated or fouled with oil (Geraci and St. Aubin, 1979) as a result of contact made while alive. Although oiled cetaceans have not been observed, the nature of their skin suggests that they may be vulnerable to effects of surface contact with hydrocarbons (Geraci and St. Aubin, 1979). The epidermis is not keratizized, but composed of live cells (Geraci and St. Aubin, 1979). Geraci and St. Aubin (1979) reported that cetacean epidermis is virtually unshielded from the environment, and may react to substances such as crude oil or gas condensates in a manner similar to sensitive mucous membranes.

Field observation of at least one instance of possible contact of gray whales with spilled oil did not show evidence of extreme effects. In 1969, the entire northward migration of gray whales passed through or near the area contaminated by the Santa Barbara Channel spill, yet the number of gray whales strandings was not significantly different from previous years (Brownell, 1971). Gas chromatograph analysis of tissues of a gray whale stranded in the vicinity of the spill did not indicate the presence of crude oil.

In addition to potential cutaneous contact with oil (or gas), inhalation of toxic substances or plugging of blowholes by oil have been cited as possible threats to cetaceans. Certainly the former is a possibility to the extent that whales may be in the vicinity of a spill prior to the evaporation of toxic compounds. The latter event has never been documented in the scientific literature. The typical breathing cycle of cetaceans involves an "explosive" exhalation followed by an immediate inspiration and an abrupt closure of the blowhole (Geraci and St. Aubin, 1979). This mechanism prevents inhalation of water and should be discriminatory of gas condensates and oil; however, toxic hydrocarbon gas could be inhaled. The effects of gas condensate or gas vapor inhalation on cetaceans are unknown.

Cetacean vulnerability to hydrocarbon ingestion would vary with species, type of hydrocarbon, and nature of the spill. Tomilin (1955) reports that cetaceans, especially benthic feeders, have a poorly developed sense of taste, and the presence of foreign bodies in cetaceans stomachs attests to this. Thus, whales may not be able to differentiate between hydrocarbon contaminated and uncontaminated food. Gray, fin, humpback, and possibly sei whales, which have been observed near the proposed sale area (graphic 12), are the endangered whales most likely to be affected by direct contact with or ingestion of pollutants as a result of the proposed sale. Of the non-endangered cetaceans, it is most likely that Dall and harbor porpoise, and beluga whales could also be affected. Another potential direct effect of spilled oil on certain whales is that of fouling of baleen with subsequent decrease in feeding efficiency. The probability of such fouling and effects on feeding efficiency is directly linked to probabilities of spills and whale contact with such spills (see later discussion). It is not practical to predict eventual population response on endangered whales as a result of baleen fouling at this time. Effects of bioaccumulation of toxic substance in cetaceans are not well understood.

The greatest potential indirect impacts from oil and gas activities on cetaceans would be reduction of food sources from acute or chronic hydrocarbon pollution, especially in nearshore areas such as near oil loading terminals, or in important offshore feeding areas such as the Portlock Bank.

As discussed previously, most of the baleen whales are seasonal feeders relying almost entirely on the abundant food sources of the Gulf of Alaska, Bering Sea, and Arctic Ocean for nourishment and living off stored blubber reserves while migrating and in their winter range. The destruction or contamination of large numbers of euphausiid and copepod crustaceans (food of fin, blue, sei, humpback, and right whales), and the destruction of benthic amphipods (food of gray whales) may adversely affect associated whale species, possibly forcing them to enter their wintering areas with insufficient or lowered energy reserves. A major oilspill event impacting widespread areas would have to be sustained to significantly impact such mobile and far-ranging cetaceans in this manner. Catastrophic events affecting primary productivity of the

Portlock or Albatross Bank could possibly approach such proportions. Although such an event is very unlikely, any local or temporary contamination or chronic pollution resulting in destruction of plankton or other important food items may be an additional stress to an endangered whale population. The extent to which physiological stress resulting from oil pollution may affect endangered whales or interact with other stressors is highly debatable and any prediction of stress-related impacts of oil pollution on endangered whales would be premature.

Effects of Noise and Disturbance: Geraci and St. Aubin (1979) reported that high frequency sounds cause permanent ear damage in laboratory animals and could adversely affect marine mammals. However, low frequency sounds, such as those likely to emanate from drilling and platform operation, are much less destructive. Physical adverse effects from low frequency sounds on cetaceans are unknown; however, noise does have behavioral and physiological effects on birds and other mammals (Fletcher, 1971). Response of animals to acoustic stimuli have generally shown variance in behavioral and physiological effects dependent on species studied, characteristics of the stimuli (e.g., amplitude, frequency, pulsed or non-pulsed), season, ambient noise, previous exposure of the animal, physiological or reproductive state of the animal, and other factors.

Research on effects of noise, particularly that associated with oil operations on cetaceans has been limited. Field observations of responses of cetaceans to disturbance which presently exist provide some index of sensitivity of whales to noise and disturbance. For example, in respect to the gray whale in southern California, Dohl, et al. (1978) concluded "the reasons for this apparent increase in utilization of offshore waters are unknown, but might be the result of increased human activity in the Bight, increased gray whale numbers, or some combination of both factors." There are no confirmed reports or documented evidence of the latter species actively and consistently avoiding exploratory or production platforms, helicopters, seismic operations, or other OCS activity; in fact, numbers of gray whales nearshore along the California coast have remained relatively stable in spite of human activities (including oil exploration) (personal communication with T. P. Dohl, University of California at Santa Cruz, 1980). Geraci and Smith (1979) concluded that species such as the gray whale seem to co-exist well with human activities and most animals become accustomed to low level background noise such as that associated with most ship traffic and petroleum activities.

On the other hand, cetaceans may respond to and avoid sources which produce sudden, variable pulsed, and/or high amplitude noise. Gregarious toothed whales typically respond to sudden disturbance by sounding, dispersion, and regrouping (Geraci and St. Aubin, 1979 in reference to Leatherwood, 1977). Fraker (1978) observed both aircraft and boat disturbance of beluga whales, a species which may be sensitive to certain types of human activity. Leitzell (1979) concluded that "uncontrolled increase of vessel traffic, particularly of erratically travelling charter-use/pleasure craft, probably has altered the behavior of humpback whales in Glacier Bay, and thus may be implicated in their departure from the bay the past two years." Other evidence of humpback sensitivity to disturbance has been reported in its wintering grounds (Norris and Reeves, 1978). However, Payne (1978) listed numerous instances of apparent insensitivity of humpback whales to noise. Probably of major significance is interaction of noise with other visible phenomena or previous experience in terms of ultimate behavioral and physiological responses of large cetaceans. Prediction of behavioral or physiological responses of large cetaceans to disturbance and noise will remain difficult, even for those types of disturbance which are consistently associated with oil and gas development.

As for other impact-producing agents, some speculation exists as to the possible induction or contribution to physiological stress on cetaceans which may result from sustained noise or disturbance. Such an impact could affect reproductive rates, resistance to disease, or endocrine balances of individuals. The extent to which disturbance due to oil and gas exploration and development in the proposed sale area would act as stressor is, of course, uncertain, but in consideration of relative importance of the proposed sale area to the various endangered species (sec. III.B.5.), such an impact would be relatively minor in the immediate vicinity of proposed sale 60.

Other potential influences on cetaceans include marine disposal of drilling muds, formation waters, and cooling waters; shoreline alterations; facility siting; dredging and filling; and secondary development. The extent of these activities during exploration should not be a major influence on endangered or other cetaceans. Decreased whale productivity could be sustained as a result of loss of habitat or habitat deterioration occurring during development and production phases. These effects would primarily be local, although incremental losses could be significant to the extent that the overall summation of regional effects would deteriorate available or important habitat (see "Cumulative Effects").

Site-Specific Impact Risks: Endangered whales most likely to occur in or near the proposed sale area include the gray, humpback, fin, and possibly sei whales (sec. III.B.5.). Oilspill risk analyses for the eastern Kenai Peninsula, Barren Islands, and northern Kodiak Archipelago (appendix D, fig. D.2, areas B, C, D) roughly approximate areas which receive seasonal use by gray whales. Results of the spill analysis (appendix D, table 8) shows these areas to be of low (8 percent chance, eastern Kenai Peninsula) to high (48 percent chance, northern Kodiak Archipelago) probability of being hit by spills over the life of the proposed field. (Note: Unless otherwise specified oilspill risk analyses made in this section will refer to probabilities conditional on the development of a production field and to spill contact within 10 days of simulated launch.) The eastern Kenai Peninsula is representative of nearshore habitats in the sale 60 area receiving most use by gray whales since it is in the migration corridor. Ultimate direct effects (see above discussion) on gray whales of spills is, however, unclear but likely to be minimal as most occurrence of the species is transitory, and the population probably does not make major use of lower Cook Inlet or Shelikof Strait for feeding. Lanfear, et al. (1980, appendix D), concluded that the proposed sale 60 poses little risk of spill contact to the eastern side of Kodiak Island. Thus, it can be concluded that direct effects as a result of oilspills orginating in lower Cook Inlet or Shelikof Strait on endangered cetaceans which frequent nearshore areas east of Kodiak Island are relatively unlikely. However, localized spill effects in the vicinity of a Talnik Point-Marmot Bay tanker terminal could be sustained, particularly for the gray, fin, sei, and humpback whales which may frequent the area. Movement of tankers across Portlock Bank could increase risks of important whale feeding areas to oilspills. It is uncertain as to the probability of spills of lower Cook Inlet region moving through Kennedy or

Stevenson Entrances into the open sea of the Gulf of Alaska. A limited number of trajectories illustrated by Dames and Moore (1980, figs. 15-30) show that most movement of spills originating in lower Cook Inlet would tend to move into Kamishak Bay or Shelikof Strait (approximately 70-80 percent of trajectories simulated). These figures, extrapolated from Dames and Moore (1980), represent conditional probabilities, i.e., that if a spill would occur, the relative probabilities of the various trajectories would be as discussed. Thus, it appears less likely that Portlock and Albatross Banks would be affected by spills than areas within lower Cook Inlet and Shelikof Strait. Within lower Cook Inlet and Shelikof Strait, it is difficult to assess impacts of spills on endangered whales, since for the various species, occurrence is dispersed or localized concentrations areas are generally unknown, if existent. Land segments (appendix D, table 14, nos. 12, 13, 14) extending from Viekoda Bay to Uyak Bay show low (6%) to medium (14%) probabilities of spill contact over the life of the proposed field. These areas receive some use by gray and fin whales, as well as by non-endangered species, such as minke whale, killer whale, harbor porpoise, and Dall porpoise.

Of the non-endangered cetaceans known or suspected of occurring in the proposed sale area, some analysis of site specific, oilspill impacts is possible for beluga whales. Marine environments nearshore in Kamishak Bay shows a relatively high probability of spill occurrence (33% chance, appendix D, table 8, area H) over the life of the proposed field. Probability of spill contact with land segments perimetering lower Cook Inlet from Kamishak Bay northward, and from Kachemak Bay northward are generally low even for a 30 day spill simulation (appendix D, table 14, nos. 58-77). Thus it can be concluded that at least one beluga wintering area may be vulnerable to effects of spills from the proposal. However, the extent of ultimate effects of spills on beluga whales are unclear but most likely would be related to temporary or long-term reduction of food supplies or decreased productivity of fish which may be present in the area, or possible avoidance by whales of affected areas.

Of all the alternatives, the proposal poses the most potential for disturbance of cetaceans in the form of noise-related or human activity related effects. Levels of activity associated with exploration are not expected to create major disturbance of cetaceans. However, activites associated with development and production phases could result in altered cetacean behavior, such as avoidance of locales which may have consistent high noise or human activity levels (e.g. proposed Talnik Point-Marmot Bay tanker terminal). Effects of technological change (e.g. extensive use of surface effects craft) could be a source of future disturbance-related impacts on cetaceans.

Indirect effects of exploration, development, and production phases of the proposed sale would be a major concern if it were known that a large or critical portion of an endangered population frequented the proposed sale 60 area. Based on present information, such use is not known to occur in lower Cook Inlet for any of the endangered whale species. Lack of information for Shelikof Strait, leaves the possibility that indirect effects such as localized reduction of food supplies could impact endangered cetaceans frequenting the area. However, compared to other habitats known to be utilized or which have been utilized (as indicated by Berzin and Rovnin, 1966), lower Cook Inlet and Shelikof Strait are of less importance and, therefore, the probability is low that oil and gas exploration will have substantial, measureable, indirect (e.g., contaminant accumulation, food chain effects, and/or habitat loss) impacts on endangered cetaceans. As mentioned above, loss of habitat or exclusion of cetaceans from existing habitats as a result of facility siting, transportation corridors, shoreline alteration, dredging and filling, and other secondary development could occur. Significance of such impacts would vary by species, locale, and the extent of incremental losses elsewhere. Potential development near Talnik Point and Marmot Bay and pipeline construction in Kupreanof Strait may be of significance in terms of temporary or permanent, localized, indirect impacts on cetaceans.

Conclusion: If the field is developed, it is possible that endangered and non-endangered cetaceans could sustain direct and indirect effects due to oilspill occurrence in areas of high risk of spill contact such as the northern Kodiak Archipelago, Kamishak Bay, and eastern Shelikof Strait. Localized effects of oilspills may be sustained in the vicinity of a tanker terminal located on the eastern side of Kodiak Island. Of all the alternatives, the proposal poses the most potential for disturbance of cetaceans from noise or other human activity. Therefore, it is possible that cetaceans would sustain negative, unquantifiable effects as a result of disturbance.

Cumulative Effects: For the purpose of this discussion, "cumulative effects" refers to the sum of direct and indirect oilspill effects (e.g. direct mortality, reduction of food sources), disturbance effects, and other types of degradation which may reduce habitat quantity or quality. Such effects are assumed to be similar qualitatively to those discussed previously in section IV.A.2. Factors which may produce overall cumulative effects on endangered and non-endangered cetaceans include petroleum-related development such as the previous lower Cook Inlet oil and gas lease sale, other proposed and existing oil and gas lease sales, and existing tankering. Also the Beluga coalfield project, construction of the Pacific LNG plant, Homer harbor and fisheries industry expansion, other small boat harbor expansions (sec. IV.A.1.h.), and other changes in marine transportation systems could produce cumulative effects.

Oilspill risks analyses (appendix D, table 8, areas B, C, D) show high probability of spills contacting nearshore areas on the eastern Kenai Peninsula, Barren Islands, and northern Kodiak Archipelago (25%, 39%, 68%; respectively) as a result of simulated proposed (if production phases are realized) plus existing production activity. Cumulative spill probability is particularly high in Kamishak Bay (Augustine Island-Cape Douglas), shown at 77 percent chance of contact over the life of the field (appendix D, table 8, area H). Land segments on eastern Shelikof Strait shorelines identified as locales frequented by fin and gray whales show moderate to high (appendix D, table 14, no. 12) probabilities of spill contact over the life of the field as a result of simulations of the proposed sale plus the existing lease area. Appendix D, table 23, shows that the eastern Kenai Peninula, Barren Island, and northern Kodiak Archipelago areas have 21 percent, 18 percent, and 20 percent probability of contact by oilspills, respectively, from existing tankering of oil which is not production from Federal lease sales. Kalgin Island (noted for beluga whale occurrence) is presently subject to a high (24%) chance (appendix D, table 25, no. 64) of spill contact due to existing tankering. Land segments bordering Kennedy Entrance and those adjacent to the Barren Islands show a low to moderate probability of contact from spills due to existing tankering (appendix D, table 25, nos. 79-82). It can be concluded that spill probability as a result of existing tankering is already relatively high for certain areas frequented by cetaceans, particularly the eastern Kenai Peninsula, and northern Kodiak Archipelago. As would be expected, and as shown in appendix D, table 20, cumulative probabilities of the existing lease sale, proposed sale, and existing tankering together would be very high for the eastern Kenai Peninsula, Barren islands, northern Kodiak Archipelago areas, Kalgin Island land segments (appendix D, table 21, no. 64), and shores of Kennedy Entrance (appendix D, table 21, nos. 79-82). Oilspill risk analyses utilized herein do not lend themselves to evaluation of cumulative effects on areas such as the Portlock Banks. However, it is possible that cumulative oilspills on the Portlock and Albatross Banks whale feeding areas could be sustained and result in decreased planktonic productivity (e.g. have indirect impact on cetaceans), particularly if proposed sale 61 or Bering Sea sales would be developed to production phases. Ultimate effects (e.g. food source losses) of cumulative spills due to the proposed and existing sales are probably minor in regard to overall endangered whale population response, assuming major negative impacts are not sustained elsewhere in the ranges of various species. Since it is unknown how extensive oil and gas development would be in other proposed sale areas, it is impossible to predict at this time the future cumulative oilspill related effects on endangered or non-endangered cetaceans associated with such proposed sales. If several proposed sales were to yield large discoveries of oil and gas, intensive production activities and resultant increases in human activity, increased localized or shipping corridor disturbance, increased pollution, or other negative effects; cumulative oilspills or disturbance could be significant for coastal species such as humpback or gray whales. Similarly, less intensive but more widespread oil production-related effects distributed throughout a species range may be significant, particularly to various sensitive species. Such species may include severely depleted and slow to recover stocks such as humpback or right whales.

Although a major portion of local hydrocarbon input into marine environments could result from the proposed sale 60 and other lease sales, localized and regional hydrocarbon inputs from other sources (e.g., urban run-off, and other non-industrial sources, marine shipping) throughout their range may also impact cetaceans. The potential effects of other pollution sources on cetaceans are unknown.

Certainly of some concern regarding disturbance of cetaceans are the long-range effects of small boat and small harbor expansion which may be independent of OCS exploration and development. It is likely that increased small boat traffic associated with improved facilities and increased recreational traffic in lower Cook Inlet and the Kodiak area could have as much if not more potential for disturbance of cetaceans as industrial activity associated with oil and gas exploration. The extent to which future discovery of petroleum in the proposed sale area or Alaska in general would lead to increased recreational boat traffic is uncertain, but lower Cook Inlet and Shelikof Strait may show more use due to proximity to Anchorage. Beluga populations in Cook Inlet may be vulnerable to cumulative disturbance since they would be exposed to boating activity in the lower Cook Inlet as well as future expansion of marine transportation near Anchorage (e.g. possible trans-inlet ferry service).

Other sources of disturbance of cetaceans which may be as much or more influence than petroleum industry impacts, either directly or indirectly, on endangered cetaceans include disturbance associated with fishing vessels. The International North Pacific Fisheries Commission Statistical Yearbook for 1976 reported nearly 2,500 fishing vessels operating in 1975 in the northeast

Pacific alone, an area representing only a portion of the range of most endangered cetaceans. Although probably not feasible to perform with any accuracy, the prediction of behavioral responses of cetaceans to acoustic perturbation of their environment ideally would also include an analysis of effects of such fisheries industry sources throughout their range. Due to present limitations, it is not possible to conclusively evaluate either long or short term cumulative effects of acoustic disturbance on cetaceans.

Unavoidable Adverse Effects: The degree of unavoidable impacts on endangered whales is unknown. Relatively high probabilities of spill contact with certain areas indicate that cetaceans or their habitats may be affected. Noise and other forms of disturbance could cause at least temporary behavioral responses of cetaceans. The Information to Lessee which recommends that the lessee operate aircraft and vessels no closer than 1 mile from observed wildlife or known wildlife concentration areas (sec. II.B.1.b.) would help to minimize behavioral disturbance of a short-term, localized nature. Present knowledge of petroleum-related activity and its relationship to cetaceans is insufficient to predict with high confidence the unavoidable adverse effects on endangered and non-endangered cetaceans. However, it can be concluded that unavoidable adverse effects of exploration on endangered and non-endangered cetaceans are probably minor, and less than might be incurred during later phases of outer continental shelf development in the proposed sale area.

Endangered Species Consultation: Pursuant to requirements under the Endangered Species Act of 1973 as amended, Section 7 endangered species consultation of the Bureau of Land Management with National Oceanic and Atmospheric Administration/National Marine Fisheries Service has been conducted, and will continue to be conducted as required. In the biological opinion rendered by NOAA/NMFS (appendix H) it was concluded, "Based upon our knowledge of the biology of these whales, the broad distribution of most of these endangered whales, the relatively small area involved in the lease sales, the very low probability of a major oilspill during exploration...and the anticipated level of exploration activities..., NMFS concludes that the lease sale and exploration activities associated with lease sales 46, 55, and 60 are not likely to jeopardize the continued existence of any of the endangered whales or their habitats."

Impacts on Endangered Birds

The Aleutian Canada goose could be affected in modes similar to those described for marine and terrestrial birds (sec. IV.A.2.d).

However, the possible occurrence of the Aleutian Canada goose on the Semidi Islands does not appear to be sufficient indication of this species being within any reasonable zone of influence of the proposed lease sale. The oilspill risk analysis (sec. IV.A.1.d., and appendix D) indicates that the probability of a spill contacting the Semidi Islands is less than 0.5 percent assuming as much as a 30-day trajectory period. It is not expected that aircraft associated with the proposed sale will have any possible disturbing influence on these islands.

Conclusion: There is no evidence at this time to suggest any significant impact of the proposed sale or associated exploratory activity on this species.

As discussed previously (sec. III.B.6), there are no other endangered avian species known to occur in the proposed sale area, and thus no impacts are expected on other endangered species.

Cumulative Effects: Cumulative oilspill effects of the proposed sale with other scheduled lease sales were considered. Potential oilspills resulting from proposed sale 60 plus the existing lower Cook Inlet lease sale, show little, if any, chance of hitting the Semidi Islands. There seems little possibility that this sale would contribute in a significant way to any other potential impacts on Aleutian Canada geese (e.g., disturbance) which may be associated with other proposed sales or projects.

Unavoidable Adverse Effects: There would be no unavoidable effect on the Aleutian Canada goose.

Endangered Species Consultation: As a result of the above summarized analysis and informal consultation with appropriate personnel of the United States Fish and Wildlife Service, it has been concluded that formal consultation under section 7 of the Endangered Species Act is not necessary at this time in regard to impacts of the proposed sale 60 on endangered birds.

g. Impacts on Terrestrial Mammals: Of the approximate 38 species of terrestrial mammals that occur in the lower Cook Inlet and Shelikof Strait, the following species could be affected to some degree by oil and gas development activities in the proposed sale area: river otter, brown and black bear, red and arctic fox, wolf, coyote, mink, wolverine, moose, and black-tailed deer.

In general, the effects of oil pollution on most terrestrial mammals would result from oil contamination of coastal habitat, and contamination or reduction of food sources. Sitka black-tailed deer and moose rely on coastal areas for winter foraging. The deer depend primarily on sedges and kelp along the coastal beaches during severe winters. An oilspill along the beaches could destroy this food source or render it unpalatable. Oil contaminated vegetation may take several years to reestablish. Black bear and especially brown bear depend on coastal streams, beaches, and river mouths for salmon and other food. Oilspills that reduce salmon populations would have a negative effect on brown bears in the area, especially the Kodiak National Wildlife refuge population which relies primarily on the abundant salmon for its existence.

Other furbearers such as mink, wolverine, fox, coyote, wolf, and river otter utilize coastal beaches for feeding and movement. Oil contamination of the beaches could destroy important food sources and expose these furbearers to direct oiling and oil ingestion through contaminated food. River otters are probably the most vulnerable of the above species to direct oiling. They are probably as sensitive to oiling as are sea otters (sec. IV.A.2.e.). They swim and forage in coastal waters and are more likely than other terrestrial mammals to be heavily coated by an oil slick. Death due to oiling could result.

The oilspill analysis indicates (sec. IV.A.1.d. and appendix D) that some coastal habitat areas along Shelikof Strait on the Alaskan Peninsula; Afognak, Raspberry, and Kodiak Islands; and Kamishak Bay are at comparatively high risk of being contacted by an oilspill in the proposed lease area. For example, the Alaskan Peninsula area from Kukak Bay south to Kinak Bay (land segment 45 table 14) has a high probability (31%) of being contacted by an oilspill within 10 days (appendix D, table 14, no. 45). The southwestern Afognak coast from Malina Bay south to Kupreanof Strait has a 23 percent probability of being hit by an oilspill. Bruin Bay (contact point in Kamishak Bay, appendix D, table 14, no. 54) has a 12 percent chance of being hit by an oilspill within 10 days. Brown bear spring coastal beach concentration and stream use areas in Bruin Bay, and Kukak Bay (graphic 9) are at moderate to high risk from potential oilspill contacts (appendix D, table 14, no. 45). Sitka black-tailed deer winter foraging areas (graphic 9) on Raspberry Island, Kupreanof Peninsula, and Uganik Island southwest to Cape Kuliuk have a moderate (11-20 percent) to high (72%) probability of being contacted by an oilspill (appendix D, table 14, nos. 14 and 25).

The proposed development scenario involves the construction of an underwater pipeline from the Shelikof Strait tracts and a 10 mile onshore pipeline from Chernof Point to Talnik Point and a 70-mile onshore gas pipeline from Anchor Point to Nikiski (sec II.B.1.a.). The pipelines and proposed tanker facilities at Chernof Point would utilize 120 acres for a terminal facility, and 5750 yd^3/10 miles for an oil pipeline and 2377m^3/km for gas pipeline. This amounts to alteration of terrestrial mammal habitat within the Whale Passage-Talnik Point area and on the Kenai Peninsula. Alterations to the terrestrial habitat can have a negative (disturbance-bears) or positive effect (create edge-plant diversity) on deer, moose, and other species. In any case, these habitat changes would probably have minimal long-term effects on deer and other terrestrial mammals.

Conclusion: Possible oil contamination of coastal beaches from large and chronic oilspills could have negative effects on terrestrial mammals, notably brown bear, moose, black-tailed deer, and river otter. Onshore pipeline construction and the establishment of tanker facilities would temporarily displace some terrestrial mammals, such as bears, and could positively affect others, such as deer and moose. The proposed actions would have minimal to moderate impacts on some terrestrial mammal populations of the above species in the Shelikof Strait and lower Cook Inlet regions.

Cumulative Effects: The combined effects of the proposed actions, the existing lower Cook Inlet lease area, existing hydrocarbon tankering, and other planned development projects (sec. IV.A.1.h.) may increase the risk of adverse impacts on terrestrial mammals and their coastal habitats within the lower Cook Inlet and Shelikof Strait regions. The cumulative increase in human populations due to OCS activities, and other development projects may increase recreational use of terrestrial mammal populations. Hunting pressures would likely increase, as well as other recreational-related disturbances and harassments of terrestria mammals and their habitats. Some species, such as brown bear and wolf populations, may be displaced, and some populations could decline for an indefinite period of time. What that means in final populations numbers cannot be assessed at this time.

Unavoidable Adverse Effects: A certain number of animals, such as brown bear, may be displaced by onshore pipeline construction and shore facilities development. This displacement would likely be temporary along the pipeline route. Oilspill contact at beaches and estuaries could result in contamination of some terrestrial mammal food, such as kelp consumed by deer, and oiling of some mammals, such as river otter, mink, and fox, that forage along the beach or swim in nearshore waters. However, these occurences would be infrequent and the number of terrestrial mammals involved would be few. Overall, unavoidable impacts would likely be minor.

h. Impacts on Social Factors:

(1) Impacts on Population: The following discussion focuses first on the communities of Kodiak and Port Lions, then turns attention to the communities of Kenai, Soldotna, and Homer. First, population forecasts are presented, then in section IV.A.2.h.(2) sociocultural system impacts are predicated on these forecasts.

Population forecasts for alternative I are presented in tables IV.A.2.h.(1)-1, -2, -3, and -4. For a more detailed discussion, the reader is referred to Alaska Consultants, Inc., 1979 and 1980.

Kodiak: Under the base case, population in Kodiak is forecast to increase from 4,818 in 1980, to 10,229 in the year 2000, at an average annual rate of increase of 5.6 percent. With this alternative the population increases at an average annual 6.1 percent to a total of 10,674 by 2000. Assuming that a construction workforce to construct facilities in the Kodiak and Port Lions areas would be separate from the downtown Kodiak area, OCS-related resident employment in the table IV.A.2.h.(1)-1 excludes this construction workforce. OCS-related resident employment is thus assumed to begin in 1982 with slightly under 100 residents in 1986 and fluctuating between 300 and 400 OCS-related residents during the 1986-1989 period. From 1990 through 2000, OCS production employment and population would increase to a predicted 420 to 445 new residents for the Kodiak area, associated with terminal facilities located at or near Port Lions and service base facilities provided somewhere in the Kodiak road-connected area.

Port Lions: The current population of Port Lions is projected under base case (without OCS) assumptions to grow at an average annual rate of 4 percent per year to a total of 481 by the year 2000. With OCS development and a potential terminal in the vicinity, this growth rate accelerates to 7.2 percent over the 1980-2000 period yielding a population of 648 by the end of this century. Construction work force prior to 1986 is assumed to be enclaved in the Kodiak-Port Lions area to construct the Port Lions terminal facility, any service base needed for Kodiak offshore support and for pipeline construction.

Kenai-Soldotna Area: Under the base case, population in the Kenai/Cook Inlet Census Division is forecast to increase from 24,012 in 1980 to 41,382 in the year 2000. For the Kenai and Soldotna areas, population is projected to increase from 4,714 in Kenai, 2,538 in Soldotna, and 7,252 in the remaining Kenai/Soldotna area in 1980, to 6,932 in Kenai, 4,622 in Soldotna, and 11,554 in the remaining unincorporated area by the year 2000. See table IV.A.2.h.(1)-3.

Under the mean find scenario, the population allocated to both Kenai and Soldotna during the 1982-86 period ranges from a low of 17 in 1982, to a high of 84 in 1968, an insignificant impact for either community. With completion of facilities, presumed to be located in the Homer area, the population allocated to both Kenai and Soldotna rises to 151 in 1987, to 184 in 1990, and then stabilizes at about 170 from 1990 to 2000. Assuming 3.2 persons per

Table IV.A.2.h.(1)-1
Forecast of Non-OCS Employment and Population: Kodiak Area and Remainder of Kodiak Census Division
1980-2000

	1980	1985	1990	1995	2000
Total Employment	6,349	8,100	9,163	10,094	10,628
Ratio of Population to Employment	1.71	1.71	1.71	1.78	1.83
Total Population Kodiak Census Division	10,856	13,851	15,558	17,967	19,556
City of Kodiak Coast Guard Remaining Road-Connected Areas	2,409	3,349	3,390	4,626	5,115
Remainder in Census Division	1,129	1,305	1,377	1,588	1,712

Source: Alaska Consultants, Inc., (1979); Technical Report No. 40, Table 14

Table IV.A.2.h.(1)-2
Kodiak Census Division Mean Find Scenario Impacts: Population Allocated to Kodiak City and Port Lions

Year	Total Employment	Total Population	Kodiak	Port Lions
1980	---	---	---	---
1981	---	---	---	---
1982	96*	179	179	---
1983	58	108	108	---
1984	70	130	130	---
1985	41*	76	76	---
1986	261*	485	318	167
1987	303*	564	397	167
1988	290	539	372	167
1989	284	528	361	167
1990	316	587	420	167
1995	320	595	428	167
2000	329	612	445	167

Source: Table IV.A.2.i-2, Employment: Kodiak Census Division, Mean Find Scenario. Dependency ratio used is 1.86 allocated to Kodiak and Port Lions as with employment.

* Excludes construction employment.

Table IV.A.2.h.(1)-3
Forecast of Non-OCS Population Kenai-Cook Inlet Census Division and Cities of Kenai, Soldotna, and Homer 1980-2000

Year	Non-OCS Population City of Kenai	City of Soldotna	Remaining Kenai-Soldotna Area	City of Homer	Remaining Homer Area	Total Non-OCS Population
1980	4,714	2,538	7,252	2,087	3,004	24,012
1985	5,114	3,003	8,117	2,909	3,415	27,582
1990	5,467	3,644	9,111	3,932	3,931	31,779
1995	6,145	4,098	10,245	4,614	4,614	36,225
2000	6,932	4,622	11,554	5,429	5,428	41,382

Source: Alaska Consultants, Inc., (1980); Technical Report 46, Volume 2, Tables 2, 3, and 4.

Table IV.A.2.h.(1)-4
Kenai/Cook Inlet Mean Find Scenario Impacts: Population Allocated to Kenai-Soldotna Area and Homer Area

Year	Total Population	Kenai	Soldotna	Kenai-Soldotna Area	Homer	Homer Area
1980	---	---	---	---	---	---
1981	---	---	---	---	---	---
1982	134	17	17	33	34	33
1983	216	27	27	54	54	54
1984	221	28	28	56	56	56
1985	166	21	21	41	41	42
1986	671	84	84	168	168	168
1987	1207	151	151	301	301	302
1988	1401	175	175	350	350	350
1989	1412	176	176	352	352	352
1990	1475	184	184	368	368	368
1995	1362	170	170	340	340	340
2000	1389	174	174	348	348	348

Source: Table IV.A.2.i-3, Employment Kenai/Cook Inlet Mean Find Scenario. Dependent ratio used is 1.86 population is allocated as follows: 50 percent to upper Cook Inlet, 50 percent to lower Cook Inlet; within the Kenai-Soldotna area, 25 percent to Kenai, 25 percent to Soldotna, and 50 percent to the surrounding unincorporated area. In the lower Peninsula, 50 percent of population is allocated to Homer and 50 percent to the Homer-Anchor Point area.

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household for this area (Anchorage Urban Observatory, 1977) on the average, this would mean between 45 and 60 new families would need to be accommodated in the communities of Kenai and Soldotna.

Homer Area: Homer area population in the base case rises from 2,087 in 1980, to 5,429 in 2000, for an average annual rate of 8.4 percent. This relatively rapid rate of growth is largely the result of Homer's expanding fishing and tourism-recreation sectors, and assumed expansion of bottomfishing activity there. Another factor included in the base case for Homer is Homer's role as an OCS service base for lower Cook Inlet OCS exploratory activity.

With this alternative, Homer area population is forecast to increase by 67 new residents in 1983, rising to slightly over 100 residents in 1982-84. From 1987 through the year 2000, resident population associated with operation of both an oil storage and tanker loading terminal and a gas compressor station would increase to over 600, with one-half assumed to reside in the Homer city limits, and another half assumed to reside in the area surrounding Homer. See table IV.A.2.h.(1)-4.

Conclusion: Base case population in Kodiak increases at an average annual increase of 5.6 percent between 1980-2000, compared with 6.1 percent under the proposal. In Port Lions the average annual rate of growth nearly doubles, from 4 percent in the base case to 7.2 percent under the proposal. In Kenai and Soldotna the change in average annual rate of growth with the proposal is neglibible. In Homer, average annual growth from 1980-2000 is 7.6 percent under the base case and rises to 8.48 percent under the proposal.

If population increases allocated to Kodiak by modal projections are in fact absorbed by Port Lions, population impacts on Port Lions would more than double, which is a major impact. Even with the smaller projected population, the community of Port Lions can anticipate increased pressure on fish and wildlife resources, short-term environmental degradation, increased noise, and other disturbances related to increased population. Secondary population accompanying oil workers may also increase competition in Port Lions, Kodiak, Homer, Kenai, and Soldotna for other local jobs, while at the same time stimulating expansion of the economy of these towns. Oilspill effects on local resources are discussed in section IV.A.2.h.(3) and sociocultural impacts of population increases are discussed in section IV.A.2.h.(2).

Cumulative Effects: The cumulative population case has already been discussed in comparing the proposal with base case projections per community.

Unavoidable Adverse Effects: Unavoidable adverse effects would include increased pressure on fish and wildlife resources, particularly in the Kodiak, Port Lions, and Homer areas, increased competition for local jobs, particularly in Port Lions and perhaps in Homer, and some environmental degradation and deterioration of the present quality of life during the construction period, particularly in the Port Lions and Homer areas.

(2) Impacts on Sociocultural Systems:

Kodiak City: While the incremental increase in OCS-related population over the period is less than 1 percent per year of Kodiak's forecasted base population, the perceived competition between OCS activities and the fishing industry for housing, support personnel, wholesale and retail trade, community and governmental services, transportation and communications suggests that even these relatively small population changes would be perceived in Kodiak as major impacts. Because of these potential conflicts, any expansion of OCS support for exploration and/or development would require certain understanding of the Kodiak community and its dynamic maritime adaptation to be successful. Careful planning and coordination with the OCS Advisory Council, the Kodiak Island Borough, and other local Kodiak institutions would be critical to establishing a successful relationship between the petroleum industry and Kodiak residents.

Since Kodiak fishermen fish the entire island, an oilspill along Shelikof Strait could have a major impact on Kodiak city and its maritime adaptation. Direct damage to the fishing environment could directly effect the fishing industry which, in turn, would directly disrupt Kodiak's economy and sociocultural system. Oil on crab gear, set gillnets, purse seines, and trawls would have economic impacts, requiring expenditures by fishermen for cleanup, repair, and/or replacement. Compensation for oil-related damage to fishing gear and loss of profits from such damage is provided for through the Fishermen's Contingency Fund (appendix G) or the Offshore Oil Pollution Compensation Fund (appendix F). Reduced catch levels, fish and shellfish contamination, and its effect on marketability of these products, potential disruption of fishing activities during oilspill cleanup, diversion of commercial air service, and Coast Guard support in the event of an oilspill could each independently effect the sociocultural system of Kodiak. The degree of impact on the environment, and hence, to the Kodiak fishing industry of a major oilspill, if one were to occur, is difficult to project.

Another perceived negative impact of OCS development on the city's sociocultural system involves the possible shift of workers from cannery employment to OCS-related work. Given the relatively low wages within the fishing industry for cannery workers, it is likely that some permanent residents of Kodiak would seek employment in the construction phase of any service base constructed on Kodiak Island, and with training, might be encouraged to seek permanent employment associated with OCS activities. It is extremely doubtful, however, that a significant fraction of the cannery work force would be diverted, particularly given the specialized character of OCS-related work and the continued reliance on west coast labor pools for additional cannery support.

Conflict between Kodiak's Native residents, village residents, and newer ethnic minorities within Kodiak such as the Filipinos, Vietnamese, and the Koreans, could be heightened if significant additional work related to OCS were to become available, and if ethnic and Native organizations were encouraged by these opportunities to actively champion the interests of their members. Again, the specialization of the permanent OCS work force argues against a significant permanent dislocation of the sociocultural system. During construction of permanent facilities, however, it is likely that competition for construction jobs could cause conflicts both within the fishing industry and between minority populations dependent upon the fishing industry.

Competition between OCS activities and the fishing industry for government support, restaurants, bars, and other recreational opportunities, temporary housing, wholesale and retail trade, and commercial air support are all potential sources of conflict if communication channels between the oil industry and the predominant fishing community are not maintained and if shortages occur in any of these services. The expanding fishing industry has already contributed to strain on or shortages of some services. Given the normal economic forces, however, it is likely that shortages in any of these services would be accompanied by expansion to meet demand, with only temporary dislocations likely. Given the oil industry's long experience in frontier areas and the tendency of the industry to supply its own needs, these dislocations would likely be minor.

Payne (1980) suggests that an infusion of job seekers into Kodiak in anticipation of OCS construction can be expected to accompany any lease sale decision in the area. Given the low probability of recoverable oil and present support services already in place in Seward and Kenai-Nikiski, it is unlikely that this potential problem would occur until and unless a major oilfield were successfully tapped. If significant recoverable oil were discovered during exploratory drilling and if a decision to move toward production of this oil were made which included facilities on Kodiak Island, then this could be a significant sociocultural impact. Even with this eventuality, however, the community of Kodiak can anticipate at least five years lead time in which to prepare media campaigns or other methods of discouraging such an influx.

Crime rates of alcohol abuse, and other measures of conflict could occur depending on several conditions. First, the number of immigrant job seekers would affect rates of conflict. Second, the degree of isolation of construction personnel during the peak construction period, could influence these rates. If rules of conduct were established prior to a construction phase and enforced through industry-community agreement, and if other anticipatory industry-community planning were to occur, many of these potential conflicts could be mitigated.

Port Lions: For a community the size of Port Lions, the impacts and changes resulting from the proposal could be substantial. Not only would the community grow at close to twice its average annual rate of growth, but the structural changes introduced by location of a terminal facility in the city or nearby Native-owned lands would add a permanent work force and families tied to the oil industry or a new subpopulation to the town's melding of Aleut and independent fishing lifestyles. Noise and other environmental disturbances associated with construction of new housing and expanded utilities, increased social and personal stress associated with this construction activity, and temporary disruption of normal activities, including temporary delays and shortages of services and goods, could all be expected. While this change would involve a fundamental alteration in many of the characteristics of the present village of Port Lions, there are social characteristics of the town's recent past which suggest it could respond favorably to these changes. The Good Friday earthquake of 1964 resulted in the relocation and renaming of Port Lions. The community has successfully adapted to these changes. Second, the legacy of the Port Wakefield cannery as an innovator in the crab processing industry and the relocation of the original village of Afognak which had prospered on Afognak Island from the earliest Russian contact period, appears to have created an energetic social system well adapted to the demands of another fundamental change. Like the community of Old Harbor across the island, Port Lion's successful adaptation after the earthquake disaster appears to have added a resiliance to its population which encourages positive response to other changes (Davis, 1980).

On the other hand, community attitudes toward OCS development in particular are not highly favorable. A recent survey conducted by KANA indicates Port Lions residents are more in favor of OCS development than other villagers along the Shelikof Strait, but still only 28 percent of the surveyed Port Lions residents clearly preferred oil and gas development, while another 17 percent were unsure. The majority view favors controlled and moderate growth up to an optimum 500 total population consistent with addition of fisheries-related industrial opportunities and the maintenance of current lifestyles.

Shelikof Strait Villages: Given the nature of the villages of Karluk and Larsen Bay and their distance from potential activity associated with this proposal, it is unlikely that major disruption of their sociocultural systems would occur unless a major oilspill affected their resource base. Like fishermen in Kodiak, residents of Larsen Bay and Ouzinkie, in particular, would be directly affected by an oilspill which reduced catch levels, contaminated local fish and shellfish stocks or the food on which these stocks depend, disrupted fishing activities during oil cleanup operations, or diverted commercial air service or Coast Guard support. These direct effects would be in addition to the effects on subsistence resources and lifestyles analyzed in section IV.A.2.h.(4). Clearly, the effects of an oilspill on both commercial and subsistence resources would be a significant impact on all of these villages.

During the construction phase of this proposal, it is likely that some local residents of these villages would seek construction employment, temporarily leaving their village during the construction season. Given the highly specialized nature of the oil industry and normal family-oriented preferences of village residents, it is unlikely that the number of residents per village and their length of stay outside the village would be great over the life of the project. During construction, villages might be forced to reallocate responsibilities temporarily if key resident individuals seek employment elsewhere. On the other hand, if training programs were instituted which encourage Native hire, there could be a depletion of key village residents from other Shelikof Strait villages to operate the hypothesized terminal near Port Lions. While this was expressed as a concern in these villages, the history of permanent long-term job shifting on the Trans-Alaska Pipeline project suggests that most Native employment on this project was relatively short-term employment or occurred under minority subcontracts during construction of the pipeline facilities (Baring-Gould and Bennett, 1975; Record, 1978; Strong, 1977).

Kenai-Soldotna Area: From the standpoint of the sociocultural systems of Kenai and Soldotna, an additional 45 to 60 families per community is not a significant impact, particularly since these additional residents would be engaged in work already prevalent in the area. The additional population resulting from the proposal would not form a distinct subgroup within either community, but would enter communities already accustomed to the oil and gas industry. The pattern of settlement in both of these communities has encouraged dispersion of families along major highways; this pattern in itself suggests the ready absorption of this new population.

One effect of additional population in these communities might be increased pressure on local fish and game. This impact should be minor under this alternative.

Homer Area: This alternative implies a minor impact on the Homer area's sociocultural systems. The political and social conflicts already inherent in Homer's present response to current OCS exploration under sale CI leases would most likely become even more intense. Conflict over use of Homer Spit, over environmental degradation, and oilspill contingencies would likely intensify, as would conflicts between environmentally oriented Homer residents and newer oil industry associated residents. As long as the number of oil-related workers remained small, as has been the case with exploratory drilling with sale CI, these internal conflicts concerning the direction of the community and its predominant lifestyles would remain relatively minor. Yet even with relatively inobstrusive exploratory drilling in effect with sale CI activity (7 exploratory wells in 3 years) Northern Resource Management reports 96 separate news items, editorials, or letters to the editor in Homer concerning OCS during the year 1977 alone. This compares with only 6 comparable newspaper items in the local Kenai paper for that same year (Northern Resource Management, 1980, pp. 140-160). This newspaper analysis is indicative of the highly charged climate of public opinion in Homer concerning oil-environment interactions, benefits, and costs.

While the Northern Resource Management study suggests that shipping lanes initiated during 1978 alleviated many of the earlier conflicts between fishermen and OCS support traffic, one could expect other issues and conflicts to arise with this proposal. Of critical importance, however, is the extent of recoverable oil found. If economically recoverable oil or gas is found, and expanded facilities are constructed in the Homer area, these conflicts would intensify.

Conclusion: This proposal could result in the following impacts on Kodiak's sociocultural systems: 1) short-term loss of cannery workers to OCS employment, 2) possible conflict between island residents over OCS-related jobs, 3) short-term competition between the petroleum and fishing industries over available goods and services, 4) influx of population, particularly industries in Port Lions, leading to strains on community infrastructure (see sec. IV.A.2.h.(3)), and 5) increased crime and other social conflict, and alcohol abuse.

The Shelikof Strait villages of Karluk, Larsen Bay, and Ouzinkie can be expected to experience minor loss of resident workers during the construction phase of the proposal. If a major oilspill were to occur along Shelikof Strait, both commercial and subsistence resources and fisheries would be adversely affected. Temporary relocation of air service during expansion of OCS activities, or in the event of a major spill might also create hardships for these villages.

Impacts on the sociocultural system of Kenai, Soldotna, and the Kenai/Soldotna area would likely be minor.

In Homer, conflicts over the direction of the community, the use of the spit, and industrial versus self-reliant, non-industrial lifestyles could intensify, particularly if development occurs and two new major facilities are constructed in the Homer area (see sec. IV.A.1.h.). An oilspill in the Homer or Kenai areas could also have widespread effect on fisheries and fishermen (see secs. IV.A.2.b. and c.), and could therefore indirectly affect the sociocultural systems of these communities. If an oilspill were to occur close to areas of heavy subsistence use in the Homer area, residents dependent on these resources could be adversely affected.

Impacts on English Bay and Port Graham are discussed in section IV.A.2.h.(4) (Impacts on Subsistence). Sociocultural impacts on these villages and on the communities of Seldovia, Ninilchick, and other smaller communities of Cook Inlet would probably be minor.

Cumulative Effects: The most important sociocultural cumulative impacts are those which may occur as a result of lease sale CI. The effects of this sale and exploratory drilling already occurring on tracts leased for sale CI are discussed above. Small boat harbor and fisheries expansion are assumed in base case population projections for Homer and Kodiak, and Pacific LNG plant expansion is included in base case population projections for Kenai/Soldotna. The Beluga Coalfield development on the west side of Cook Inlet could intensify subsistence-recreational hunting and fishing conflicts, particularly for the village of Tyonek (see Braund and Behnke, 1980), as could State lease sale 35.

Unavoidable Adverse Effects: Unavoidable adverse effects would occur in the city of Kodiak in the form of increased crime and intensified competition for OCS-related construction jobs. Workers may be drawn to OCS activities from Kodiak Island villages. Such an emigration would disrupt the sociocultural systems of these villages. Given the probability of oilspills occurring as a result of the proposal (sec. IV.A.1.d.), it is likely that at some time during the life of the proposed action, the sociocultural systems would be adversely affected. The degree of impact on sociocultural systems would depend on the extent of damage to commercial and subsistence resources upon which most village residents depend.

(3) Impacts on Community Infrastructure: This has been identified as a major scoping issue (sec. I.F.). The local areas likely to be affected by the proposed sale are the Kenai, Homer, Kodiak, and Port Lions areas. Tables IV.A.2.h.(1)-1 through -4 show the population growth expected to result from the proposed lease sale for these areas. In general, infrastructure requirements are directly related to population growth. The reader is referred to section IV.A.2.h.(1) for a detailed discussion of population projections for the proposal.

Kenai Area: Population growth resulting from the proposed lease sale in the Kenai area is considered insignificant. The average annual growth rate in Kenai is forecast to increase by .0018, and in Soldotna by .0034. This increase would cause no additional strain on community infrastructure requirements over and above those experienced in the base case. The reader is referred to section III.H.2. for a complete discussion of the base case forecast for infrastructure requirements.

Homer Area: Population growth expected to result from the proposed lease sale in the Homer area is considered insignificant. The average annual growth rate in Homer is forecast to increase by .0034. This increase would cause no additional strain on community infrastructure requirements over and above those experienced in the base case. The reader is referred to section III.H.2. for a complete discussion of the base case forecast for infrastructure requirements.

Kodiak Area: Population growth expected to result from the proposed lease sale in the city of Kodiak area is considered insignificant. The average annual growth rate in the city of Kodiak is forecast to increase by .0045. This increase would cause no additional strain on community infrastructure requirements over and above those experienced in the base case. The reader is referred to section III.H.2. for a complete discussion of the base case forecast for infrastructure requirements.

Port Lions: Population growth expected to result from the proposed lease sale in the Port Lions area is considered substantial. The average annual growth rate in Port Lions is forecast to increase by .0314. This increase would cause considerable strain on community infrastructure requirements over and above those experienced in the base case. This is of particular concern given that a significant increase in population would occur in 1986 (see table IV.A.2.h.(1)-4).

The most significant concern is the shortage of available housing. Under the base case, the community is forecast to experience a housing shortage by the mid-1990's. Under the proposed lease sale, this shortage would occur much sooner, in the mid-1980's. There is virtually no housing available to immigrants to the community. The housing stock could be expanded to accomodate the forecasted expanded population. However, such an expansion concurrently demands expansion of other services such as water, sewer, electrical power, police, and fire protection. If oil terminal facilities were annexed to Port Lions, the community's tax base would likely expand so that the community could cope with this rapid expansion of services. Of significance, however, is the time lag between demand for the expanded services and the revenues generated from the new tax base.

The community has expressed a desire to attract industry, primarily fishing-oriented industry. Furthermore, the community has demonstrated an ability to attract financial resources for expansion when required. Given this combination, it can be assumed that Port Lions could effectively deal with the forecasted growth.

Conclusion: Insignificant impacts would occur to the Kenai area, Homer area, and Kodiak area under the proposed lease sale. The Port Lions area would experience substantial growth under the proposed lease sale; however, the community's desire to attract industry, its demonstrated ability to attract financial resources, and its stated ability to plan for and control growth, indicate that impacts could be accommodated if OCS development was desired by the community.

Cumulative Effects: Cumulative effects resulting from the proposed lease sale and other projects (described in sec. IV.A.1.h.) would occur only in the Kenai and Homer areas. Minor impacts could be expected in Kodiak and Port Lions.

Unavoidable Adverse Effects: It seems likely that no unavoidable adverse impacts on community infrastructure would occur as a result of the proposed lease sale. The reason for this is that additional growth requirements in the Kenai, Homer, and Kodiak areas resulting from the proposed sale are considered insignificant and the growth in Port Lions is considered manageable.

(4) Impacts on Subsistence: According to Alaska statutes, "subsistence uses" are those customary and traditional uses in Alaska of wild renewable resources for direct personal or family consumption (AS, sec. 16.05.940).

Graphic 14 indicates the primary subsistence use area for the villages of Karluk, Larsen Bay, Ouzinkie, Port Lions, English Bay, and Port Graham. Subsistence areas for the first three villages were defined by village residents of the Shelikof Strait villages themselves in consultation with Alaska OCS Office and Kodiak Area Native Association staff. For English Bay and Port Graham, approval to use information collected by North Pacific Rim, Inc. was obtained from the councils of the two villages. In each case, village council approval and support was obtained before the information was mapped.

Tables III.C.1.d.-1 and III.C.1.d.-2 on the back of graphic 14 indicate the primary subsistence species used by residents of each of the four villages along Shelikof Strait, as well as by English Bay and Port Graham residents in Cook Inlet. Halibut, at least three species of salmon, flounder, trout, cod, crab, clams, seal, sea lion, ducks, deer, ptarmigan, and rabbit are primary species on which these villages depend.

Primary subsistence species are those resources that contribute substantially to family diet, are important cultural elements both as foods for important community events, and as activities around which family and community life are centered and organized. Primary subsistence resources are not only essential to the daily life and diet of resident villagers, but they provide the economic security normally associated with money in a cash economy.

While considered "secondary" resources, or less central diet elements from the point of view of either weight, amount harvested or yearly catch, most secondary resources of these villages back up primary resources used and provide nutritional variety and balance to local families. The small "bidarky" or sea urchins, clams, and octopus, for example, are all delicacies which are highly prized and shared widely throughout the community through informal visiting and at feasts. While perhaps not essential nutritionally, these foods are important elements of cultural tradition and are frequently referred to by their Aleut-Russian names, even by residents who speak English.

Another characteristic of secondary resources is their availability during periods of scarcity of primary resources. During these times, secondary resources may be utilized more heavily, in fact, supplant scarcer primary resources. In English Bay, for example, residents now utilize a wider range of fish from the area as game has become more scarce. Similarly, sport fishing pressure on silver salmon in the Kodiak area has reduced this species' use as a primary subsistence resource in both Port Lions and Ouzinkie, forcing greater utilization of pink salmon by these villagers.

Secondary resources for the villages along the Shelikof Strait include less plentiful salmon species, herring, fish eggs, octopus, "beach food," tanner crab, bird eggs, and locally available wild vegetables and berries. Secondary resources in English Bay and Port Graham include less plentiful fish species, fish eggs, less plentiful crab species, sea lion (in English Bay only), bird eggs, berries and wild vegetables.

Subsistence use (take) of both primary and secondary resources could be affected by human population increases and environmental disturbances in the proposed lease sale area. It could also be affected by potential oilspills. Section IV.A.2.h.(1) discusses direct impacts associated with increased population in the proposed lease sale area. Sections IV.A.2.a. through g. discuss impacts on specific biological resources in the proposed lease sale area. For a general discussion of the Oilspill Risk Analysis, see section IV.A.1.d.

For the proposal, the Oilspill Risk Analysis indicates four major oilspills are likely over the life of the field and a 98-percent probability of at least one spill. A major spill event which contacted shore within 10 days could significantly reduce subsistence take of marine birds, seals, and sea lion, crab, clams, sea urchins, and other shellfish for varying periods of time. If the spill were to occur in winter, beach foraging deer, ducks, and clams might all suffer increased mortality, thereby reducing subsistence take of these species. Fish in their developmental stages could be reduced by a major spill, perhaps significantly reducing the following year's fish catch for that area.

Villages dependent upon seals and sea lions, in particular, might be affected both directly and indirectly by the oiling of sea mammals, as well as by reduced fish populations. See sections IV.A.2.a. through g. for further discussion of biological impacts.

For this alternative, land segment 15 at Kupreonof Strait has a high risk of oilspill contact (see sec. IV.A.1.d.). Land segments 13 and 17 at Ugak Bay and Black Cape have medium risk of oilspill contact within 10 days. Land segment 15 contains prime nearshore crabbing and fishing grounds of three Kodiak west-side villages (Larsen Bay, Ouzinkie, and Port Lions). Land segment 13 contains prime fishing, clamming, crabbing, and hunting grounds for the villages of Karluk and Larsen Bay. An oilspill at any of these locations or one which spread to the subsistence use areas of these four villages could significantly effect the local economies of these villages by affecting both subsistence take of residents and money income of commercial fishermen in these villages. All of these villages obtain well over 50 percent of their diet from local subsistence resources. A survey conducted by KANA in Port Lions in February 1979, for example, estimated that 72 percent of local meals include subsistence resources (KANA, 1979, OEDP Report). Without denying the cultural significance of subsistence resources, only one village along Shelikof Strait (Ouzinkie) has a store of sufficient size to provide minimum protein needs in the event of a major disaster which affected subsistence take. All other villages depend on small aircraft or local fishing boats to obtain food from Kodiak grocers. Particularly in winter, residents of Karluk, without a local store, and Larsen Bay and Port Lions, with small, expensive stores, could suffer considerable stress from both the inability to obtain subsistence foods during oilspill cleanup operations and diversion of or weathering in of small aircraft to supply food needs. The reader should consult section III.C.1.d. and Davis (1980) for a more complete discussion of the cultural significance of subsistence foods and practices.

The effects on subsistence take of different species would vary by season and magnitude of the spill, its duration in intertidal areas, current and bottom sediment conditions of the area, as well as species response to oil contamination and other disturbances associated with the spill itself and with cleanup operations.

A range of probable effects can be presented, however. In winter, reduction of subsistence take of ducks and deer might seriously stress village residents whose food stocks were low. If subsistence hunting were restricted during oilspill cleanup or if populations of these resources were depleted by oilspill contact, village residents could be disrupted. In summer, a spill which seriously reduced or tainted salmon stocks and juvenile salmon, crab, and other fish for an extended period of time (months) could severely stress these village economies from 1 to 2 years. If major clam beaches were oiled, villagers might be unable to harvest clams and other "beach food" for several years. Village residents forced to hunt and fish at greater distance from their local areas because of oilspill contamination and its effects could be hard-pressed financially to afford increased transportation costs.

Another way of viewing oilspill risks associated with this alternative is to compare the overall risk of a major oilspill event contacting a village's subsistence use area. Refer to table IV.A.2.h.(4)-1.

According to this table, the average risk is highest for the village of Larsen Bay and lowest for the village of English Bay. These risks shift in the cumulative case. They also do not take into account the effects of chronic small-scale oilspills from oil rigs or tankers, which would be more probable and would likely affect the Port Lions and Anchor Point-Homer areas.

Conclusion: With this alternative, subsistence take of both primary and secondary subsistence resources could be significantly disrupted. This disruption could result from direct and indirect consequences of an oilspill as well as from human population pressure on subsistence resources caused by establishment of OCS facilities in a local area. The disruptions to the local economies of subsistence villages would vary with the season, the size of the spill, and many other factors. A minimum of a few weeks of restricted hunting, fishing, and gathering; greater effort in obtaining sufficient food supplies; and stress associated with food shortages could be expected. If oilspill contamination of major fishing, crabbing, and clamming areas were extensive, village subsistence take could be reduced for several years.

Cumulative Effects: The combined effect of the proposal with present offshore development from sale CI tracts and proposed and existing tankering of oil from Cook Inlet oil discoveries substantially increases the risk of oilspills to English Bay and Port Graham and adds an additional risk of close to 20 percent for each of the Shelikof Strait villages. Table IV.A.2.h.(4)-2 shows both the risk for the proposal and the comparable percentage once cumulative effects of sale CI and proposed and existing tankering are taken into account. Refer to the above discussion for the implications of these increased risks.

These oilspill model predictions show that the added risk to village subsistence use areas is substantially greater for the Cook Inlet villages of English Bay and Port Graham under the cumulative case, because of increased risk due primarily to potential tankering accidents. Additional risk to Shelikof Strait villages is about 18-19 percent for each of the villages. Combined with the already high risk these village subsistence use areas facewith the proposal, the potential risk for the cumulative case is well over 50 percent for all of these villages. It approaches 70 percent for Larsen Bay, largely because its subsistence use area encompasses high risk land segments 13, 14, and 15.

Unavoidable Adverse Effects: The proposed action would increase the risk of oilspill disruption of subsistence village economies. This risk would vary according to a number of factors, but would be greatest for the village of Larsen Bay and would also be high for Port Lions and Ouzinkie. If development occurs, increased population pressure on subsistence resources would also be unavoidable, although the extent of this pressure can be regulated by the Alaska Department of Fish and Game.

Table IV.A.2.h.(4)-1
Composite Risk of an Oilspill Event by Village
Shelikof Strait and Cook Inlet Villages

Karluk	24 percent
Larsen Bay	51 percent
Ouzinkie	45 percent
Port Lions	41 percent
English Bay	8 percent
Port Graham	10 percent

NOTE: This risk is calculated from the oilspill risk analysis (sec. IV.A.1.d.). The estimated oil resources used for oilspill risk calculations are "unrisked mean estimates"--the amount of oil expected to result from the proposed sale assuming that oil is discovered in economically recoverable quantities.

Table IV.A.2.h.(4)-2
Composite Oilspill Risk Analysis
Percentage Risk for the Proposal and Cumulative Tankering Risk for Shelikof Strait Villages, English Bay and Port Graham

	Proposal	Cumulative + Tankering	d[1/] =
Karluk	24 %	42 %	18 %
Larsen Bay	51 %	69 %	18 %
Ouzinkie	45 %	64 %	19 %
Port Lions	41 %	60 %	19 %
English Bay	8 %	46 %	38 %
Port Graham	10 %	55 %	45 %

[1/] d represents the difference between the second column and the first column.

i. Impacts on State, Regional, and Local Economies:

(1) State and Regional Impact: The economic impact of the proposal on the State, regional, and Anchorage economies is mild and, therefore, not discussed in this text. Those interested in exploring these impacts should see: USDI/BLM/Alaska OCS Socioeconomic Studies Program documents, Technical Memorandums 1 and 2, Lower Cook Inlet EIS, ISER, "The Growth of the Alaskan Economy: Future Conditions Without the Proposal and Lower Cook Inlet Petroleum Development Scenarios: Economic and Deomgraphic Impacts and Supplementary Memorandum.

(2) Impact on Local Economies: The economic impact of the proposed lease sale on local areas has been identified as a major scoping issue. The areas likely to be significantly affected by the sale are Kenai, Homer, Kodiak, and Port Lions. Tables IV.A.2.i.-1, -2, and -3 below show the estimated base case employment for the four areas. They also show the estimated primary and secondary employment impact of the proposed lease sale assuming a mean development and resource case. These impacts have been calculated by the ISER map and Census Division economic models assuming the proposal and a mean development case. Moreover, this material is summarized in table IV.A.2.i.-4 where impacts and base case employment forecasts are compared for the four areas. Impacts are described below.

Kenai Area: The stimulative employment impact of the proposal on the Kenai area would be mild. As table IV.A.2.i.-4 shows, employment in the Kenai or central Cook Inlet area is forecasted in the base case to increase at a moderate 2.5 percent per year during the 1980's. The table also shows a similarly moderate 3 percent per year growth with the proposed development. An additional hiring of 397 people in 1990 would not disrupt local labor markets because they can easily draw on the large Anchorage labor pool. Besides employment, local hire, and local purchase, a small increase in local tax revenue and expenditures could be expected in the central area because most new facilities and new tax base would be located elsewhere, and borough tax revenues could be channeled toward services in areas where facilities were located.

Homer Area: As table IV.A.2.i.-3 shows, prospective increases in Homer area employment without a sale 60 development are a rapid 5.2 percent per annum during the 1980's. With the sale, the increase in Homer area employment by the end of the 1980's amounts to nearly 400 people which accelerates the growth rate of employment in Homer to a rather high 6.5 percent per year. This increase in employment implies rapid growth, but not boom conditions. This would constitute a moderate economic impact. Disruptive impacts from local hire would likely be mild because of the availability of the large Anchorage labor pool. In addition, impacts from local industry purchases would likely be mild as most purchases would likely center in the Kenai area where most existing subcontractors are located. Finally, the increase in tax revenues and government spending impacts for Homer may be moderated because, under the proposal, a large oil terminal would be located in the area, and the State or borough tax revenues could be used to offset the impact of the facility. At a 30 mil rate State and borough revenues would amount to $9 million per year in 1979 dollars. This large sum compares to a less than $1.3 million surplus forecast to be available for capital improvements in the city of Homer in the 1990's (Alaska Consultants, 1980).

Table IV.A.2.i.-1
Base Case Employments
Lower Cook and Kenai

Year	Kenai Soldotna Area Total Employment	Non-Camp Employment	Construction Camp Employment	Homer Area Total Employment	Non-Camp Employment	Camp Employment	Kodiak Areas
1980	5,386	5,240	146	1,742	1,742	---	6,349
1981	5,269	5,425	844	1,814	1,814	---	6,694
1982	6,916	5,593	1,323	1,897	1,897	---	7,028
1983	6,048	5,628	420	1,976	1,976	---	7,377
1984	5,829	5,829	---	2,068	2,068	---	9,765
1985	6,100	6,017	83	2,295	2,211	84	8,100
1986	6,431	6,309	122	2,526	2,442	84	8,373
1987	6,560	6,507	53	2,602	2,602	---	8,609
1988	6,751	6,751	---	2,799	2,799	---	8,840
1989	6,750	6,750	---	2,763	2,763	---	8,982
1990	6,906	6,906	---	2,892	2,892	---	9,163
1995	7,692	7,672	---	3,313	3,313	---	10,094
2000	8,336	8,336	---	3,619	3,619	---	10,628

Source: Alaska Consultants Lower Cook Inlet Petroleum Development Scenario, Local Socioeconomic Systems Impact Analysis BLM/Alaska OCS Socioeconomic Study Program, pp. 77-78.

Table IV.A.2.i.-2
Kodiak Census Division
Mean Find Scenario Impacts

Year	Direct Employment	Secondary Employment	Total Employment	Total[1] Kodiak City (resident)	Total[1] Port Lions (resident)
1980	---	---	---	---	---
1981	---	---	---	---	---
1982	155	22	177	177	---
1983	39	19	58	58	---
1984	39	31	70	70	---
1985	38	24	62	62	---
1986	276	132	408	318	90
1987	254	118	372	282	90
1988	194	96	290	200	90
1989	194	90	284	194	90
1990	198	118	316	226	90
1995	198	122	320	230	90
2000	198	131	329	239	90

[1] Port Lions employment equals by assumption one-half of operating personnel for the terminal (60) plus 50 percent for secondary employment (30). The remaining employees are assumed resident in near by Kodiak City even though some of them (as during construction) may barrack in Port Lions.

Source: Porter, E. D., 1980, p. 65

Table IV.A.2.i.-3
Kenai/Cook Inlet
Mean Find Scenario Impacts

Year	Direct Employment	Secondary Employment	Total Employment	Kenai Soldotna Area[1]	Homer Area[1]
1980	---	---	---	---	---
1981	---	---	---	---	---
1982	85	32	117	59	59
1983	87	31	116	58	58
1984	97	22	119	60	60
1985	121	33	154	77	77
1986	508	122	630	315	315
1987	657	169	826	413	413
1988	585	168	753	376	376
1989	585	174	759	379	379
1990	610	183	793	397	397
1995	544	188	732	366	366
2000	544	203	747	374	374

[1] The census division employment impact is split 50/50 between the southern and central areas.

Source: Porter, E. D., 1980, p. 64

Table IV.A.2.i.-4
Employment Impact
Mean Find Scenario

Year	Kenai Area Employment	Kenai Area Employment Impact	Homer Area Employment	Homer Area Employment Impact	Kodiak[1] Area Employment	Kodiak Area Employment Impact	Port Lions[2] Area Employment	Port Lions Area Employment Impact
1980	5,386	---	1,742	---	6,349	---	166	---
1981	6,269	---	1,814	---	6,694	---	171	---
1982	6,916	59	1,897	59	7,028	117	176	---
1983	6,048	58	1,976	58	7,377	58	181	---
1984	5,829	60	2,068	60	7,765	70	186	---
1985	6,160	77	2,295	77	8,100	62	192	---
1986	6,431	315	2,526	315	8,573	318	198	90
1987	6,560	413	2,602	413	8,609	282	204	90
1988	6,756	376	2,799	376	8,840	200	210	90
1989	6,750	379	2,763	379	8,982	194	217	90
1990	6,906	397	2,892	397	9,163	226	223	90
1995	7,692	366	3,313	366	10,094	230	258	90
2000	8,336	376	3,619	374	10,628	239	299	90
Annual Change 1980-1990 TOTAL	2.5%	3.0%	5.2%	6.5%	3.7%	3.9%	3.0%	6.6%

[1] Includes Port Lions

[2] Port Lions employment is assumed to increase at a moderate 3-percent rate over the period. The 1980 employment is from Kodiak Census Division Health Plan material cited in sections III.H.3. and III.C.2.b.

Source: Alaska Consultants Lower Cook Inlet Petroleum Development Scenarios, Local Socioeconomic Systems Impact Analysis BLM Alaska OCS Socioeconomic Study Program, pp. 77-78.

Kodiak Area: As table IV.A.2.i.-4 shows, the Kodiak area employment and economy are expected to increase at a moderate 3.7 percent per year during the 1980's. When the employment impact of proposal is added, employment rises by only 200-300, and the employment growth remains a moderate 3.9 percent per year. Thus, the employment impact of the proposal on Kodiak would likely be mild. The employment is small relative to total Kodiak employment, and local hiring should not be disruptive as the development can draw from the Anchorage and stateside labor pool. Industry purchases in Kodiak from subcontractors would also be relatively small because of the lack of oil industry subcontracting services in Kodiak. Only some mild increases in trade and transport type services would likely occur. Similarly, a government spending boom due to increased tax revenues would be unlikely if Port Lions annexed the area where the hypothesized oil terminal would be located. However, this may not be the situation and a $300 million dollar terminal would then generate a large revenue ($9 million) for the borough. In this case, considerable borough government spending might occur through various transfer arrangements.

Port Lions Area: As table IV.A.2.i.-4 shows, the Port Lions area is forecast to have moderate growth of 3 percent over the proposal's development period. With development of an oil terminal in the Port Lions area, the employment in 1990-95 would increase from 223 to 258. Over the decade, annual growth more than doubles to a high 6.6 percent. The number of construction workers living in the Port Lions area barracks has been, for impact purposes, assigned to Kodiak employment as has one-half the terminal operating personnel. These employees may cause mild secondary impacts on the Port Lions area.

In summary, the proposal could cause major economic and employment impacts in Port Lions. These impacts are mainly in the form of permanent employment and could be considered to be favorable. The development is so large relative to the town that potentially disruptive local hiring may occur if not dealt with through industry and community planning. Potential for disruptive impacts from local purchases would be large and limited only by the lack of needed facilities and subcontractors in Port Lions. Finally, the potential for government spending by the municipality of Port Lions would be likely if the town annexed the terminal area.

Kodiak Island Villages: It appears likely that direct employment and income impacts would be virtually non-existent (not greater than the projected 2 percent per annum rate) for Karluk, Larsen Bay, Akhiok, Ouzinkie, and Old Harbor. It is likely there will be little new employment created in these five villages. Some small indirect employment opportunities would perhaps be created in all villages due to some increase in recreation and tourism travel in Southcentral Alaska. These increases, however, would depend on whether new opportunities and services are provided by local residents. Local residents may or may not choose to encourage or discourage this type of economic activity.

Conclusion: Mild employment and economic impacts would be likely in the Kenai and the Kodiak areas because of their large sizes. Moderate impacts would likely occur in the Homer area because of its smaller size and location near the hypothesized oil terminal. Finally, major impacts would likely occur in the Port Lions area due to the town's relatively small size and the hypothesized oil terminal located there.

Cumulative Effects: If sale CI moves into a development stage, and sale 60 exploratory activities are successful, economic boom conditions could occur in Kodiak.

Unavoidable Adverse Effects: It seems likely that no unavoidable adverse economic impacts will occur because of the proposal. The reason for this is that the moderate impact on the Homer area and the major impact on the Port Lions areas are largely due to permanent employment increases which many would consider economic benefits rather than losses.

j. Impacts on Cultural Resources: Impacts from offshore activities could indirectly and directly affect archeologic and/or historic resources. Direct sources include oilspills (appendix E) and construction activities (secs. IV.A.1.b. and c.). Indirect sources include induced industrialization (secs. IV.A.1.b. and c.), changes in population (secs. III.C.1.a. and IV.A.2.h.(1)) and changes in land use status (sec. III.C.5.a).

The lower Cook Inlet and Shelikof Strait shorelines have numerous prehistoric and historic cultural resources listed by the Alaska Department of Natural Resources, Division of Parks (Heritage Resources Survey, 1980) (sec. III.C.3.). Many areas formerly above water and now beneath the inlet and strait show evidence of man. Small bays with shallow access may contain undisturbed archeological sites.

Procedures are being established by the Advisory Council on Historic Resources, the State Historic Preservation Officer (keeper of the Alaska Heritage Resource Survey File), the National Park Service, the Geological Survey, and the Bureau of Land Management to ensure protection of submerged cultural resources.

If the proposal is implemented, some cultural resources may be subjected to change. The probability of these impacts occurring ranges from very likely to very unlikely. However, impacts on cultural resources in the lower Cook Inlet are expected to be minimal.

Direct effects are those such as construction activity, which would directly damage or destroy a cultural resource. Other direct effects would result from activities, such as pipeline construction or an oilspill. Archeological sites could be damaged by oil and could be further damaged by oil removal.

The sites most suited for pipeline landings and construction are also those with the highest probability of containing cultural resources. Offshore construction activities, such as platform installation and pipeline burial, could damage or destroy archeological sites. Pre-construction surveys would probably result in the discovery of most cultural sites in the area. These surveys may be conducted after consultation with the Geological Survey District Conservation Manager, the Council on Historic Resources, and the State Historic Preservation Office.

Onshore, an increase in population could result in a rise in "pot-hunting" at accessible historic and prehistoric sites. With increased population, the risk and incidence of wild fires could rise, and sites, such as Tanaina house remains or pioneer cabins, may be damaged or destroyed. Fire control activities, such as trail building, could also damage cultural resources. The Heritage Conservation and Recreation Service (HCRS) has proposed a program for occupancy and maintenance of historic cabins and houses, which may alleviate some impact.

National Register Sites: The Bureau of Land Management (BLM) and the State Historic Preservation Office (SHPO) have agreed that the sites shown on graphic 13 are on, or have been nominated to the National Register of Historic Places. Although the list is complete for National Register sites, the State Historic Preservation Office points out, and the Bureau of Land Management concurs, that many additional known and undiscovered sites exist within the area. The BLM and SHPO staffs further agree that the following five sites are the National Register listings that appear most vulnerable if this proposal is implemented.

Selenie Lagoon Archeological Site: This site, AHRS-SEL-064, is comprised of a midden which is considered to hold very significant information. Adverse impacts could occur from oilspills reaching the site, by pothunters in the region, and by potential OCS development at the site.

Yukon Island: This site, SEL-001, is exposed to wave action and could be contaminated by an oilspill. Pothunters also pose a potential problem. Because the island is open to the public, with the exception of a small privately-owned area, it would not be subject to land use changes unless selected under the Alaska Native Claims Act.

Chugachik Island Site: This island, SEL-033, is comprised of many middens and other sites. Some middens are exposed to storm tides and would have a small chance of oilspill contamination. Pothunting is currently a problem and would likely increase unless controls are imposed. Chugachik Island is part of Kachemak Bay State Park.

Cottonwood Creek Site: The large midden at this site, SEL-030, is exposed to storm tides, and may be exposed to oilspill contamination or to pothunting. The site is on public land.

Coal Village Site: This site, SEL-021, is a former Russian coal mining operation. Remains include some narrow gauge railroad tracks, building foundations and mine pits. The lower part of the site could be affected by an oilspill, but the effect would be visual and temporary.

The SHPO and BLM staffs have concurred that two National Register listings, Ninilchik and Hope, could be indirectly and potentially adversely affected.

Ninilchik: Ninilchik, KEN-032, still retains a 19th century Alaskan village atmosphere. Industry-related population increases or industrial construction could result in an influx of new residents and changes in land use. New population and construction could radically alter the character of the village.

Hope: Hope, SEW-018, is much the same now as it was 70-80 years ago. Some minor increase in permanent residents and commerce would be beneficial in maintaining the town's viability, but excessive growth could damage its historic character. If development on the Kenai Peninsula occurs, the town's cultural resources may be stressed because of increased visitors to the site.

The BLM and SHPO staffs have concurred that development resulting from the proposal may potentially impact archeologic or historic sites and structures around Kenai and Seward. Many known sites and buildings exist in both areas that are considered possibly significant for inclusion on the National Register.

Other cultural resources not along the shore that have high potential risk (see sec. IV.A.l.d. for a discussion of oilspill risk), are the Kamishak Bay area, Anchor Point, Ushaget Island, the Barren Islands, the Karluk area, and the areas across the Shelikof Strait from Karluk on the Alaska Peninsula.

Marine Archeology: Federal agencies are required by Executive Order 11593 to locate, identify, and nominate to the National Register of Historic Places qualifying cultural resources within their jurisdiction. Presently, BLM/OCS studies are being conducted by the University of Alaska, and procedures have been established involving the HCRS, in its role as technical advisor for such resources, the Geological Survey, and the Bureau of Land Management, whereby a satisfactory cultural resource reconnaissance survey may be implemented to discover these resources prior to construction. The actual mechanics and required procedures for conducting this survey are found in the "Notice to Lessees and Operators." This procedure sets forth the precise specification and equipment requirements which shall be used. (See cultural resources stipulation in sec. II.B.l.b.)

The BLM, upon identification of areas of high probability for submerged cultural resources, would make specific recommendations to the Geological Survey District Conservation Manager with which leased tracts stipulation should be enforced. BLM would also recommend a specific set of criteria for conducting these surveys and would submit these recommended operating procedures to the District Conservation Manager. After receipt of these recommendations, the Geological Survey would then decide whether to follow the recommendations of the BLM or to take another course of action. Only the Geological Survey, not the BLM, has the authority to enforce cultural resource stipulations, and this primarily depends on the decision of the District Conservation Manager. Although the District Conservation Manager is obligated to consider the recommendations of the BLM, he is not required to follow these recommended courses of action.

Based on an evaluation of the geological characteristics of the proposed lease area, there is little potential for the occurrence of submerged cultural resources. There are, however, a number of proposed lease blocks (see the red blocks on graphic 13) in the lower Cook Inlet and Shelikof Strait which have some potential for containing prehistoric or historic cultural resources. It has been suggested that these areas be surveyed (Alaska OCS Office Staff, 1980).

If cultural resource surveys are not performed adquately, or if cultural resources exist and are not detected, then they could be damaged by pipeline construction or by anchors dragging from drillships.

Conclusion: The onshore cultural resources in the area of the proposed sale may be directly, adversely affected if a major oilspill reaches the shoreline. Oilspill risk for shore sites is generally moderate. Onshore sites could be adversely affected by construction activities, industrialization, increased population in the area, and changes in land use status.

Cumulative Effects: Cultural resources in the lower Cook Inlet could be additionally impacted by several other proposed actions (refer to sec. IV.A.l.h.). Impacts on historic and prehistoric archeologic sites would be in danger of oilspill contamination, damage by construction, and damage resulting from increased population and land status changes. .The cumulative effect would be an increased probability that cultural resources in the lower Cook Inlet and Shelikof Strait would be adversely affected.

Unavoidable Adverse Effects: Although surveying and core sample examination should reduce unavoidable adverse effects, some artifacts would probably be lost as a result of OCS activities.

k. Impacts on Visual, Wilderness, and Recreation Resources: The proposed lease sale would result in insignificant impacts on the surrounding area in the form of the few platforms which might be visible from the air, from boats, and from points along the Sterling Highway. An oilspill would cause temporary visual impact, especially along the coast, where the greatest number of people would have opportunity to view it.

Impact to wilderness resources would result from pipeline construction along the 16 kilometer (10 mi) stretch of land from Chernof Point to Talnik Point on Kodiak Island. A service road would probably be constructed from Chernof Point to Port Lions. It would parallel the pipeline and would be maintained at least as long as needed for petroleum-related activity. The wilderness character of the area would be temporarily disrupted by construction activity and would be altered by the presence of the road.

If OCS development occurs causing increased population, it would be likely that some wilderness areas (Alaska Peninsula, Kodiak Island, Kenai Peninsula, and the western side of Cook Inlet) would be more heavily used for recreation. There would probably be no measurable adverse impact on the wilderness character of these areas, given the low population increase projected for this alternative.

OCS-related population increases would result in an unquantifiable increase in competition for recreation resources, principally clams, halibut, and salmon. These impacts would most likely be felt by those who seek recreation in already heavily used areas of the Kenai Peninsula, such as the Sterling Highway, Clam Gulch, the Russian River, and Homer (see sec. III.C.4.) and by those who use Cook Inlet for recreational fishing. Increased pressure on recreation resources near the City of Kodiak and near Port Lions could be expected, especially if the pipeline service road near Port Lions would be opened to public use. The road would provide more access to a now much less accessible area.

An oil terminal at Anchor Point would result in displacement of 120 acres (49 hectares) from recreation use.

Petroleum-related vessel traffic in Shelikof Strait near Kodiak and Port Lions, and in Cook Inlet would probably not interfere with recreational boat traffic.

Oilspills would pose a risk to recreation resources such as clams, fish, and beaches. Refer to sections IV.A.2.a. and b. for a more detailed discussion of impacts on these resources.

Conclusion: Adverse impacts on visual, wilderness, and recreation resources would be minor and, in most cases, temporary. Platforms and oilspills would result in visual impacts. Construction activities in wilderness areas would temporarily disrupt the character of these areas. The presence of a service road would alter the wilderness character of the area between Port Lions and Chernof Point. Population increases resulting from OCS activities would result in slightly greater recreational use of wilderness areas and other already heavily used recreation areas, especially on the Kenai Peninsula. Oilspills could adversely affect recreation resources as described in sections IV.A.2.a. and b.

Cumulative Effects: Existing oil and gas activity in Cook Inlet adds risk to visual, wilderness, and recreation resources from oilspills most notably in the Anchor Point and Kamishak Bay areas. Oilspill risk increases there from medium and low, respectively, in the proposal, to high when sale CI and existing tankering activities are also considered (see sec. IV.A.1.d.).

Population increases resulting from the proposal plus other projects (described in sec. IV.A.1.h.) would likely result in increased use of already heavily used recreation areas as well as greater use of wilderness areas and would very likely contribute more to increased recreation pressure than the proposal alone.

Unavoidable Adverse Effects: Unavoidable visual impacts would result from platforms and oilspills. Displacement of wilderness acreage for construction of pipelines, a service road, and OCS-related facilities would be unavoidable. Increased use of recreation resources in wilderness and already heavily used recreation areas, and oilspill impact on recreation resources such as beaches and fish, could occur.

1. Impacts on Land Status and Land Use:

Impacts on Land Status: Technically, land status impacts refer to ownership and interests in land, and configuration of land parcels, etc., rather than the use of land. For the Cook Inlet portion of the proposed sale area, land status impacts would not be significantly affected during the exploratory phase of operation. OCS use of onshore support bases, public docks, etc., would all involve existing facilities and land suitable for this purpose. The construction of port of Homer improvements and the possibility of acreage being made available for an OCS staging area and supply base is more of a land use rather than a land status impact. Refer to section III.C.5.c. regarding the port of Homer Development Plan.

The proposed scenario presumes onshore facilities in the Cape Starichkof/Anchor Point area, with a gas pipeline running along the Kenai Peninsula to Kenai. The Cape Starichkof/Anchor Point coastal area is already in predominate private land ownership. Assuming that land purchase or lease agreements can be established between the property owners and OCS operators, the only land status impact in this area would be a division of legal parcels. Further land division activity may occur around the onshore terminal, processing facilities (if any), and gas compressor stations.

The siting of a gas pipeline from the marine terminal-pipeline landfall to the Nikiski liquefaction facility could result in a significant land status impact. The land ownership pattern is mixed among the State of Alaska, the Kenai Peninsula Borough, individual cities, Native village corporations, the Cook

Inlet Region, Inc., and private land owners contiguous to the Sterling Highway corridor. Successful siting of the gas pipeline may involve land exchanges, land divisions, and right-of-way easements. This land status impact would be mitigated to the extent that an existing utility transmission line corridor, which parallels the Sterling Highway, could be used for siting of a buried gas transmission line.

For the Shelikof Strait portion of the proposed sale area, the siting of a marine oil terminal at Talnik Point and an oil pipeline from Chernof Point to the oil terminal could cause significant land status impacts on Kodiak Island. No land status impacts on Afognak Island or its adjacent smaller islands are anticipated from this proposal. The possibility of a significant adverse impact on Kodiak Island turns on the willingness of the land owners, the Afognak Native Corporation and/or the city of Port Lions, to either sell, lease, or otherwise grant a right-of-way easement to their land. Neither land owner has made an official statement regarding the availability of its land for an OCS onshore support facility, marine terminal, and/or an oil pipeline. Refer to section III.C.5.c. regarding the Port of Lions Comprehensive Development Plan.

Impacts on Approved Land Use/Master Plans: The land use impacts ensuing from the proposal can be defined in two different respects: a) the estimated acreage requirements of the postulated onshore OCS-related facilities; and b) the conflict or inconsistency of the postulated onshore facilities with approved land use/master plan(s). This latter definition of land use impact derives from CEQ regulations implementing NEPA (40 CFR 1502.16(c), 1506.2(d); 43 FR 55978).

The following impact assessment compares a schematic location of postulated onshore facilities against applicable plan requirements. No specific site review is performed in this EIS because no site specific development actions are included in the OCS leasing proposal.

The environmental assessment on the proposal includes a petroleum development scenario. The purpose of this scenario is to hypothesize plausible events ensuing from the sale based upon industry experience and behavior. The scenario specifically includes assumptions on onshore facility requirements. However, only a schematic location of the postulated facilities is provided in a candidate area given the uncertainity on eventual exploration and production plan submittals. Refer to section II.B.1.a. for further discussion of the purpose and contents of the petroleum development scenario.

Impacts of the Hypothesized Oil Terminal and Gas Compressor Station at Cape Starichkof-Anchor Point: The acreage requirements for the oil terminal and related facilities is estimated at 120 acres (49 hectares), while the requirement for the gas compressor station facilities is 40 acres (16 hectares). Refer to table II.B.1.a.-1 regarding the petroleum development scenario. The aggregate acreage requirement for both of these facilities, 160 acres (64 hectares), would be accommodated by vacant lands specifically reserved for industrial use in the Cape Starichkof area. The Draft Final Ports and Harbors Plan of the Kenai Peninsula Borough (KPB) recommends setting aside roughly 900 plus acres of land in the Cape Starichkof area (Woodward-Clyde Consultants, 1980). Thus, the postulated OCS onshore facilities will moderately impact the inventory of land recommended to be zoned for industrial use.

On the basis of plan policies alone, the siting of energy production facilities, i.e., oil terminal and gas compressor station, outside of the North Kenai-Nikiski area would be incompatible with the approved KPB Plan. However, the approved plan also states that if new energy development facility needs emerge from OCS operations in Cook Inlet, then the borough and community plans should be revised. Refer to section III.C.5.c. regarding the KPB "Comprehensive Planning Program: Recommendations" (Alaska State Housing Authority, 1970). The proposed oil terminal and gas compressor station would nominally pose an adverse land use impact on the KPB 1970 Plan. However, this impact will apparently be mitigated or eliminated by future KPB Plan changes.

The Borough is in the process of finalizing a Ports and Harbors Master Plan which, however, has yet to be officially adopted (Woodward-Clyde Consultants, 1980). The Draft Final Plan calls for a deep water port at Cape Starichkof to accommodate the OCS energy transportation needs, among other uses. In context of this Draft Final Plan, the scenario assumption of a marine oil terminal at Cape Starichkof would appear to be compatible with it and pose no adverse land use impacts.

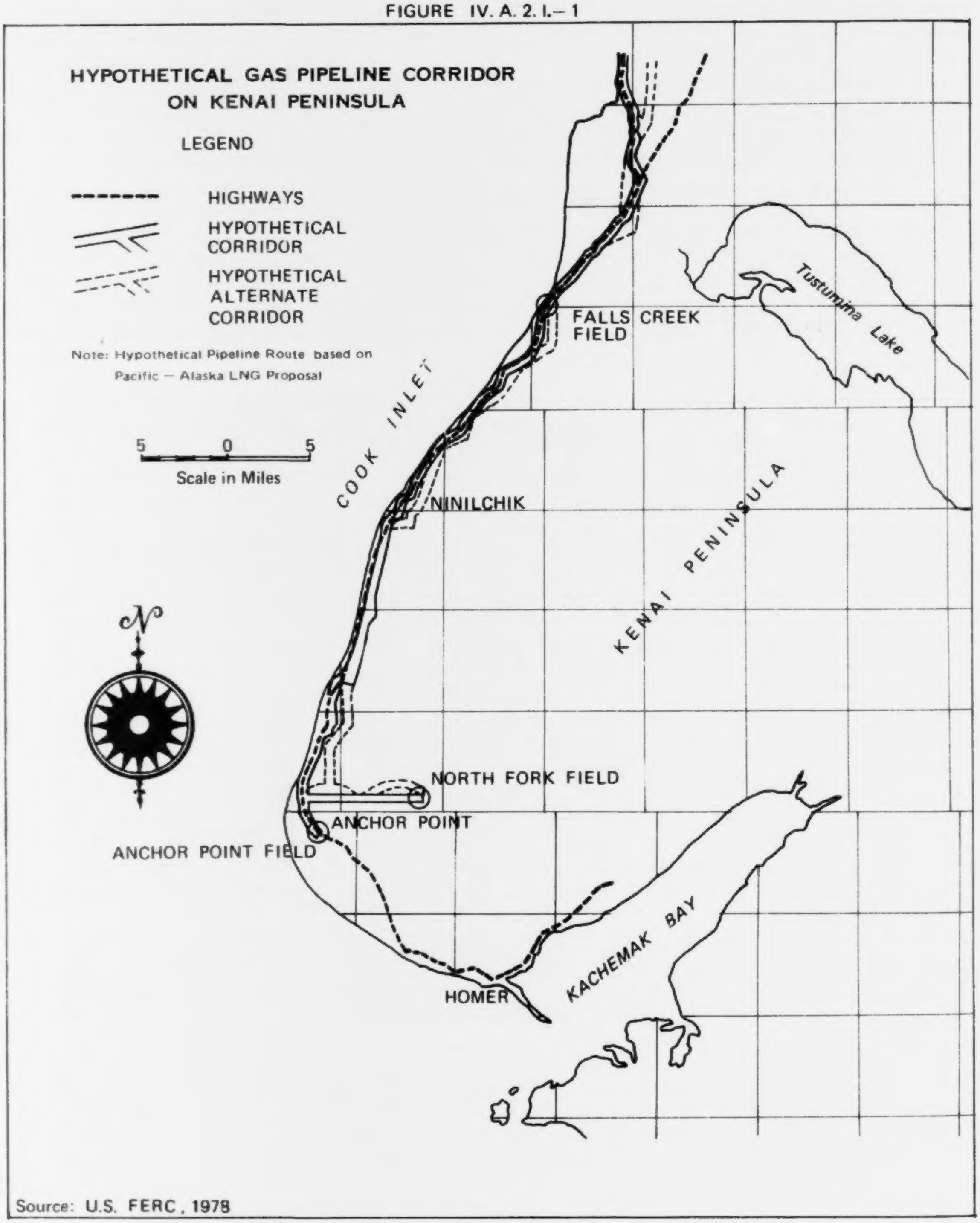
If the gas pipeline landfall and onshore gas compressor station were sited within the Borough's plan area for Anchor Point, then this location would be inconsistent with the land use policies for Anchor Point. However, these facilities could be located north of the Anchor Point Plan area. Also, the KPB Plan for the unincorporated area could be revised as indicated above.

Impacts of the Hypothesized Gas Pipeline from Cape Starichkof/Anchor Point to Nikiski: The scenario includes a gas pipeline which is schematically located in a corridor paralleling the Sterling Highway from the pipeline's southern terminus north to the city of Kenai. From Kenai, the pipeline corridor would parallel the Kenai Spur Road to the existing liquefaction facilities in the north Kenai/Nikiski area. Figures IV.A.2.1.-1 and -2 offer a possible corridor delineation for the gas pipeline. The figures are derived from a proposal of the Pacific-Alaska LNG Associates (U.S. FERC, 1978) to construct a collection system of gas pipelines to serve its proposed liquefaction plant and marine terminal at Nikiski. It should be emphasized that the pipeline corridors shown on figures IV.A.2.1.-1 and -2 are schematic only and do not fix a specific route. Acreage estimates for the gas pipeline include the following: The right-of-way (ROW) requirement could be in the range of 30 feet (low) to 100 feet (high). Given a pipeline distance of 7 miles (113 kilometers), estimated in the development scenario, the pipeline acreage requirements would range from 254.5 acres (103 hectares) to 848.5 acres (343.4 hectares). These acreage estimates can be readily accomodated by vacant lands contiguous to the Sterling Highway corridor on the Kenai Peninsula and along the Kenai Spur Road. Hence, no significant impact upon vacant land inventory on the Kenai Peninsula is expected from the postulated pipeline.

The Pacific-Alaska LNG facility and gas pipeline application assumed a 50-foot ROW requirement for the pipeline. The application also indicated that additional land clearance would be required along the ROW for construction and maintenance purposes. However, no estimate of additional ROW beyond 50 feet was offered in the FEIS on the proposal (U.S. FERC, 1978).

The impacts of the postulated gas line upon the land use policies and plan of the KPB are unclear: The Borough's policies on petro-chemical facilities being sited in Nikiski refer to heavy industrial facilities for processing of

FIGURE IV. A. 2. I.– 1



HYPOTHETICAL GAS PIPELINE CORRIDOR ON KENAI PENINSULA

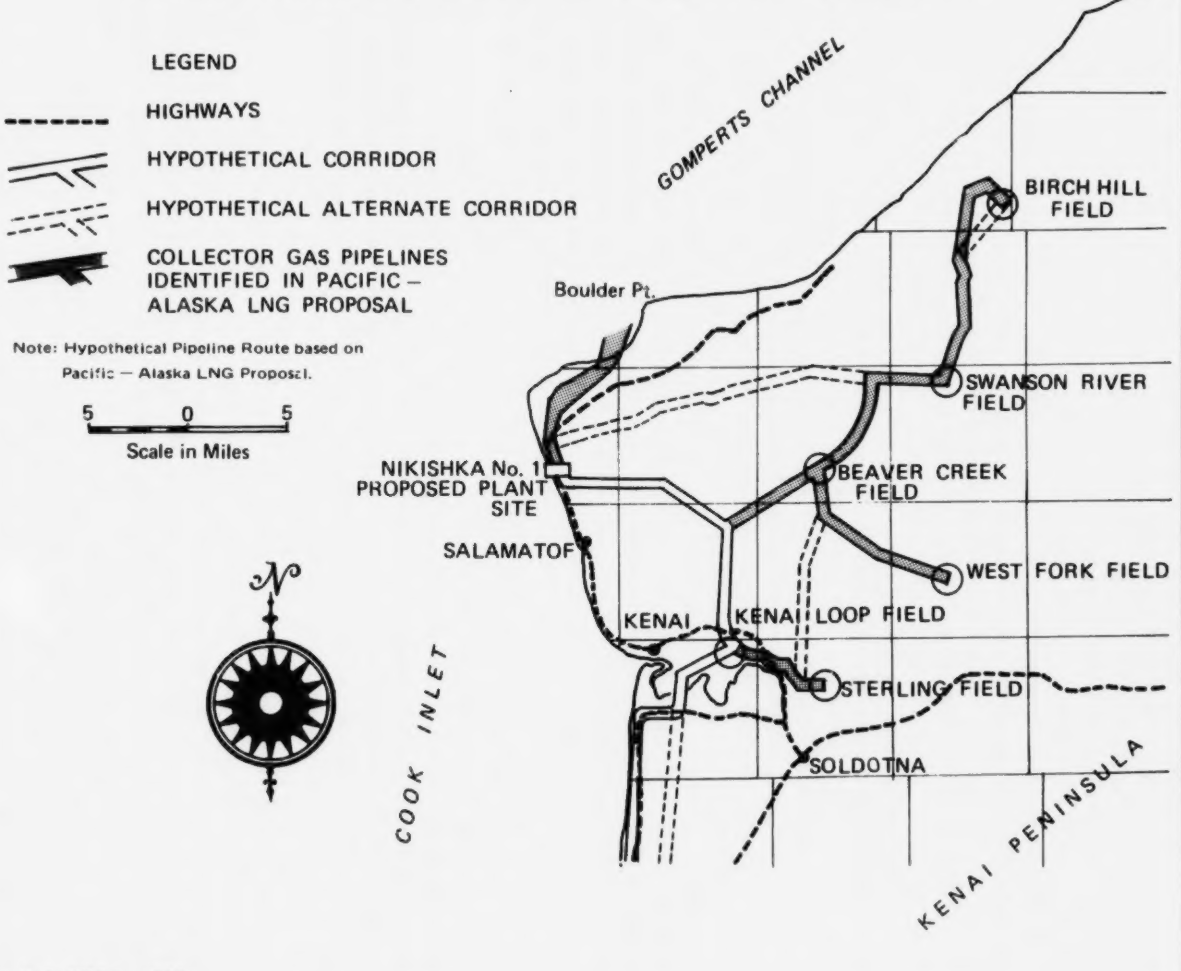
LEGEND
HIGHWAYS
HYPOTHETICAL CORRIDOR
HYPOTHETICAL ALTERNATE CORRIDOR
5
0
5
Scale in Miles
COOK INLET
FALLS CREEK FIELD
Tustumena Lake
NINILCHIK
KENAI PENINSULA
NORTH FORK FIELD
ANCHOR POINT
ANCHOR POINT FIELD
KACHEMAK BAY
HOMER

Note: Hypothetical Pipeline Route based on Pacific – Alaska LNG Proposal

Source: U.S. FERC, 1978

FIGURE IV. A. 2. I.– 2

HYPOTHETICAL GAS PIPELINE CORRIDOR ON KENAI PENINSULA


LEGEND
HIGHWAYS
HYPOTHETICAL CORRIDOR
HYPOTHETICAL ALTERNATE CORRIDOR
COLLECTOR GAS PIPELINES IDENTIFIED IN PACIFIC – ALASKA LNG PROPOSAL
Note: Hypothetical Pipeline Route based on Pacific – Alaska LNG Proposal.
5 0 5
Scale in Miles
GOMPERTS CHANNEL
Boulder Pt.
BIRCH HILL FIELD
SWANSON RIVER FIELD
BEAVER CREEK FIELD
WEST FORK FIELD
KENAI LOOP FIELD
STERLING FIELD
NIKISHKA No. 1 PROPOSED PLANT SITE
SALAMATOF
KENAI
SOLDOTNA
COOK INLET
KENAI PENINSULA
N

Source: U.S. FERC, 1978

hydrocarbons and manufacturing of hydrocarbon products. The policies do not address transmission lines which pose a negligible permanent impact in terms of labor force, infrastructure, emissions, etc., especially when the transmission lines are buried. Finally, the Borough's 1970 plan offers no land use policy on the siting and compatibility of pipelines which pre-existed the plan. Given the ambiguity of the Borough's plan on pipeline siting, it is difficult to identify the adverse affects of the postulated pipeline corridor upon the KPB plan. Moreover, the Borough's intention to modify its plan, pending new commercial finds of hydrocarbons, could mitigate or eliminate any possible adverse land use impacts from siting of the postulated gas pipeline.

The routing of a gas pipeline through the Kenai Flats area under the jurisdiction of either the city of Kenai's Comprehensive Plan (R.W. Thorpe and Associates, 1979) or the Corps of Engineers (COE, 1978), could adversely impact restrictive land use designations in the area. Both the Kenai and COE plans would protect critical wetlands habitat. Additionally, the Kenai Plan identifies lowland areas which, for various reasons, pose constraints on development. Refer to section III.C.5.c. regarding these plans.

The land use policies of the Kenai Plan regarding publically owned wetlands in its "Conservancy Zone" are unclear with regard to the siting of the gas transmission line: If the gas pipeline can be construed in the land use category of "Transportation" or "Utilities" and is found to be coastally dependent in its siting, then it would be allowed in the wetland areas. However, if the pipeline is found to be not coastally dependent in its siting, or the city commits its publically owned wetlands to preservation through a rezoning act, then the gas pipeline would be a disallowed use of the municipality-owned wetlands. This latter situation poses a clear conflict in land uses and the postulated pipeline corridor would constitute a significant adverse impact. This impact could, however, be eliminated by routing the pipeline to the east of the publically owned Kenai River Flats-wetlands area.

With regard to the COE Kenai River Review, a gas pipeline sited across the wetlands area and the navigable portion of the Kenai River would require COE permits. Under the COE's "Permit Activities Classification" for the area, the proposed pipeline could be a compatible land and water use. This finding of land use compatibility turns on specific construction and pipeline design practices. These practices cannot be identified with this EIS on an OCS leasing proposal only. Presumption of a pipeline applicant's willingness to comply with COE permit conditions, which would reflect in part U.S. FWS concerns, would result in no adverse land or water use impacts upon the COE Plan. Refer to section III.D.3.b. and III.A.2. regarding a U.S. FWS proposal for "Area Meriting Special Attention" designation of the Kenai River Flats area under the ACMP.

As the postulated gas pipeline corridor moves northward to the Kenai city limits and enters the unincorporated area of north Kenai/Nikiski, it would be regulated by a Borough Comprehensive Plan for the unincorporated area. The Borough's plan for the north Kenai/Nikiski area specifically allows and encourages industrial and energy facilities to be sited in the coastal zone. Hence, the postulated gas transmission line is presumed to be a compatible land use with this KPB Plan area. Refer to figure III.C.5.b.-1 for a schematic diagram of the Borough Plan.

Impacts on Liquefaction Facilities at Nikiski: No land use impacts of the liquefaction facilities or the marine terminals at Nikiski are expected because a) there are existing facilities of this type, and b) proposed facilities have been approved by Federal, State, and local regulatory agencies (U.S. FERC, 1978), and c) the KPB Plan for the north Kenai/Nikiski area specifically allows heavy industrial and petrochemical industry land uses.

Impacts of Postulated OCS Support and Supply Base Operations at Nikiski and Homer: The petroleum development scenario assumes that all marine support and supply operations will be handled through either Nikiski or Homer. The existing support and supply bases at Nikiski, including storage yards, helicopters pads, marshalling areas, should suffice for both exploration and production phases of sale 60. The existing Rig Tenders Dock at Nikiski should also suffice for goods movement and forwarding operations to berth rig tendors and supply boats. Hence, no land use impacts for support and supply base activity at Nikiski are anticipated.

The support and supply operations at Homer would impact existing facilities if no improvements in existing facilities were made. The existing city dock of Homer can handle OCS support and supply functions. However, the berthing capacity is limited, interference with other maritime commerce can occur, and insufficient storage yards and marshalling areas could pose problems for goods movement.

Land use policies of the city of Homer appear to tentatively accomodate OCS onshore support and supply functions (City of Homer, 1978). The city's "Comprehensive Development Plan" does not specifically disallow these land uses and considers their presence in this city's future. However, the plan also indicates that adverse effects from OCS spillover land use impacts would be dealt with effectively.

Better guidance on the city's land use policy towards OCS support and supply base activity is available in its Draft Port of Homer Development Plan (TAMS Engineers, 1980). Based upon this draft plan, the proposed improvements to the port of Homer would clearly accomodate and would anticipate OCS support and supply operations. If the plan is adopted by the city and the KPB, no adverse land use impacts from expanded OCS support and supply operations at the Port of Homer are anticipated.

Impacts of Postulated Oil Pipeline and Marine Terminal Development in the Kizhuyak Bay Area: The petroleum development scenario includes an oil pipeline on portions of Kodiak Island. If a commercial find of oil is made in the Shelikof Strait portion of the sale area, the postulated pipeline would be routed in the unincorporated territory of the Kodiak Island Borough (KIB). The land use impacts of this postulated pipeline on KIB land use policy are difficult to determine: The adopted KIB Comprehensive Plan assesses the Chiniak Bay area only (Tryck, Nyman, and Hayes, 1972). Hence, there is no land use/master plan established for the area of the postulated pipeline corridor. More recent plans and studies sponsored by the Borough have not been officially adopted but are expected to be incorporated into the Borough's Coastal Management Program (CMP). Refer to sections III.D. and IV.A.2.n. regarding the Borough's CMP and the impacts of the proposal on this program. The Borough has an adopted "OCS Development Goal" which discourages the development of OCS-related facilities in or around population centers on Kodiak Island. Additionally, the goal requires such facilities to be self-sustained and to be remotely sited. Expressing this goal as a land use policy, the postulated pipeline routing could be considered compatible in that it would not be near a population center. The southern terminus of the pipeline at Talnik Point would be at least 3 miles from the community of Port Lions. The postulated pipeline corridor could also be considered remote: It would be sited in de facto wilderness. Finally, the pipeline would be self-sustained through operator maintenance of pumping stations and service facility sited with the postulated marine terminal (see below).

The petroleum development scenario assumes a ten-mile (16 kilometer) pipeline distance from Cape Chernof to Talnik Point. The acreage requirements estimated for the oil pipeline would be 36.4 acres (14.7 hectares) assuming a 30-foot ROW, or 121.2 acres (49.1 hectares) assuming a 100-foot ROW. The range of acreage requirements for siting of the pipeline are expected to pose an negligible impact on vacant lands inventory in the de facto wilderness area.

However, the terminal and related facilities may not be considered sufficiently remote and distant from the population center of Port Lions. The Talnik Point area is beyond the city limits of Port Lions; the postulated terminal would pose no land use impacts upon the Port Lions Comprehensive Development Plan. The acreage requirements for a marine terminal and related facilities at Talnik Point are estimated to be 160 acres (164 hectares). Siting of these facilities should pose an insignificant impact upon vacant land inventory for the area as it is presently de facto wilderness.

Impacts of Spillover Land Uses from OCS Development: Spillover land use impacts from OCS development are defined as indirect development activity which ensues from a commercial find of OCS hydrocarbons and a decision to produce the hydrocarbons. These impacts are difficult to project with any confidence because of the uncertainities involved.

Spillover land use impacts on the central Kenai Peninsula area of Kenai-Soldotna-Nikiski, as well as the Homer area, are detailed in the BLM OCS sponsored Local Socioeconomic System Study for OCS Sale 60 (Alaska Consultants, 1980). Summary findings of this study are the following:

a. For the city of Kenai, the demand for residential land use could be 135 acres, or less than 2 percent of land available for residential land use under the plan (73,110 acres).

b. For the city of Soldotna, the demand for residential land use could be 125-130 acres, or approximately 35 percent of the available land zoned for residential land use (330 acres). However, it should be noted that an additional 2,860 acres of unclassified city lands are undeveloped; some of this acreage could be suitable for residential use and could be available for eventual development.

c. For the city of Homer, the demand for residential land use could be 210 acres. The city of Homer Comprehensive Development Plan provides no projection of planned residential land use in acres. Additionally, the plan provides no inventory of existing residential land uses in acres. In the absence of discrete land use information, there is a possibility of a significant residential land use impact upon the city of Homer.

Spillover land use impacts upon the community of Port Lions from the siting of a marine oil terminal and related facilities, as well as the onshore pipeline terminus, are difficult to estimate. The extent of the spillover effect depends upon whether the terminal-pipeline operator provides on-site housing and support services, whether this arrangement is imposed by land owners and/or the KIB through lease instruments or land use regulations, or whether the community of Port Lions encourages additional residential development. There is ample vacant land within the city limits of Port Lions. An inventory of legal parcels in residentially-zoned areas exists in the community, and there are recorded land patents from which new residential subdivisions could be devised. Given the uncertainity of the spillover land use activity, and the small size of the community of Port Lions, there is a possibility of a significant adverse impact upon local land use from the siting of the postulated OCS facility.

Spillover land use impacts upon local communities can be mitigated to the extent that the communities pursue aggressive planning programs. If the communities do not wish to experience spillover residential growth, then recourse is available through participation in the Alaska Coastal Management Program (ACMP), reviewing and commenting upon the OCS development and production plan submittals, and negotiating with OCS operators to provide enclave housing facilities.

Conclusion: The summary findings of land use impact assessment are:

> No significant impact of facilities postulated in the scenario in terms of acreage requirements are anticipated because of the size of vacant lands inventory.
>
> The marine oil terminal and related facilities along with the gas compressor station postulated for the Cape Starichkof/Anchor Point area will be consistent with the Draft Final Ports and Harbors Plan of the Kenai Peninsula Borough (KPB). The facilities are inconsistent with the 1970 plan for the unincorporated peninsula. However, this plan anticipates revisions if new OCS finds are made.
>
> The gas pipeline postulated from Cape Starichkof to Nikiski would have indeterminate land use impacts upon the KPB 1970 Plan. The gas pipeline could pose significant adverse impacts on the Kenai River Flats area in terms of the city of Kenai Comprehensive Plan and the U.S. COE River Wetlands Review Requirements.
>
> The scenario's postulated usage of existing (Phillips Petroleum) and/or proposed (Pacific-Alaska) gas liquefaction facilities and marine terminals at Nikiski is consistent with existing, as well as proposed, land use for the area.
>
> The support and supply facilities operations posulated for the communities of Nikiski and Homer should not pose any significant adverse impacts if the Draft Final Borough Ports and Harbors Plan and Port of Homer Development Plan are adopted. If no improvements are made to the Homer Spit and the Port of Homer's existing facilities, then significant adverse impacts on land use from support and supply bases could occur.

The postulated oil pipeline from Cape Chernof/Talnik Point and the oil terminal at Talnik Point would have indeterminate land use impacts because of the absence of any Kodiak Island Borough (KIB) plan for the area. The postulated facility locations could be considered consistent with an official KIB "OCS Development Goal". Resolution of land use impacts, if any, from these postulated facilities could occur through the KIB Coastal Management Program.

Spillover land use impacts upon local communities, such as Kenai, Soldotna, Homer, and Port Lions, from OCS development are difficult to determine. Recognizing the uncertainities, there is a possibility of significant adverse effects upon land use plans of Soldotna, Homer, and Port Lions.

Cumulative Effects: Cumulative land use effects of the proposal are discussed for each element of the scenario summarized above:

The only cumulative land use impact upon the Cape Starichkof area would be if a deep water port were established there along with the marine oil terminal. This is a possibility, however, no proposals have been forwarded, and it more likely that such a port would be located near or at existing ports in the Kenai Peninsula.

The siting of the postulated gas pipeline may be cumulatively impacted by other utility lines or an additional oil or gas pipeline sited in the same right-of-way (ROW) corridor. It is expected after the first pipeline ROW has been established, that a subsequent pipeline would be sited within the same ROW. Under this arrangement, cumulative land use impacts would be avoided or minimized. A possibility of cumulative land use impact could occur in the Kenai River Flats area where separate gas transmission lines corridors could be established for collecting gas from new producing gas fields. The unitization of the gas transmission lines or a requirement of a common ROW corridor by landowners and pipeline regulators could minimize this possible cumulative effect.

No cumulative adverse land use impacts from the proposal are anticipated upon the industrial land uses of the Nikiski area.

The postulated oil pipeline from Cape Chernof to Talnik Point and the marine terminal postulated at Talnik Point are unlikely to be accompanied by additional land development. The facilities would be located in a remote area. If commercial quantities of hydrocarbons were discovered in the Shelikof Strait from some hypothetical lease sale. If the find is made within an economic pipeline distance of the Talnik Point terminal, then the pipeline would be routed in the same ROW onshore and it would use the postulated terminal at Talnik Point. Other land use development at the Talnik Point area and along the pipeline ROW is not foreseeable. The one possibility of cumulative adverse impacts upon land use in the Cape Chernof to Talnik Point area would be commercial timber harvesting operations which would be undertaken by the Afognak Native Cooperation. However, the land use impacts of the submerged pipeline with minor land clearance are likely to be less than those associated with commercial timber harvesting operations.

Spillover land use impacts in the communities of Soldotna, Homer and Port Lions could be accompanied by additional land development which would cumulatively and adversely impact local land use. Local and State public policies and planning provide a statisfactory means for controlling land use development and potential adverse impacts. Hence, the possibility of cumulative adverse "spillover" land use impacts could be effectively mitigated through application of public policies and planning programs.

Unavoidable Adverse Effects: No unavoidable land use impacts are anticipated from the postulated petroleum development scenario. The land use impacts associated with the scenario and discussed above are amenable to site planning, land use regulations, etc., which renders the impacts avoidable rather than unavoidable.

m. Impacts on Transportation Systems: The following section will contain an analysis of the impacts, resulting from the proposal and other actions interrelating with the proposal, on the transportation systems of the affected areas. The analysis will be organized so as to describe perceived impacts on each of the affected geographical areas according to the stage of industry activity, i.e., exploration, development, and production.

In order to extrapolate likely transport impacts it will be necessary to organize the logistics flow of industry activity along some reasonable modal linkage. Industry activity during the previous sale CI has provided some indication as to how the transfer of workers and material will be accomplished in relation to sale 60.

In sale CI (which has not progressed beyond the exploratory period) the majority of workers and material were brought through Anchorage and then, respectively, flown or trucked to bases on the Kenai Peninsula. This scenario will be followed in the analyses contained in this section. However, it should be kept in mind that timely and significant improvements in the harbor capacity of the city of Homer would render it, from an economic point, a much more viable entry port.

In this analysis Port Lions will be viewed as an ancilliary to the Kenai support bases and will function primarily as an air support base. The Port Lions base will throughput mainly workers and foodstuffs and an overall quantity of material small in relation to the total effort.

Kodiak Island Exploratory Period

Impacts accruing to Kodiak Island transportation systems as a result of sale 60 exploratory activity whould be minimal, except in the Port Lions where moderate impacts from the expansion of the airport could be expected. Initial air and sea support operations for the entire sale area will issue from bases located on the Kenai Peninsula. In the event that a commercially recoverable hydrocarbon reservoir is located within the Shelikof Straits a forward air support base may be constructed at Port Lions. Miller Airfield, and to a lesser degree Kodiak Airport, may also be used for industry activities.

Impacts on the Air Mode: Utilization of the airfield at Port Lions would only be possible after the lengthening of the runway surface, the installation of navigational aids, the construction of hanger and warehouse facilities, and the construction of a helioport. The physical nature of the terrain surrounding the Port Lions airfield would allow the airfield to be expanded some 305 meters (1,000 ft) on land. The remaining 457 meters (1,500 ft), or more necessary to expand the field to allow its use by larger aircraft, could only be acquired by extending the runway into Kizhuyak Bay. There is sufficient flat land around the field to allow construction of a small complex of storage facilities, hangars, helioport, and living quarters.

Miller airfield and Kodiak Airport are two facilities which could provide air support bases for Shelikof operations. Miller Airfield, located on Cape Chiniak, is a former U.S. Air Force Base. It has been closed to the general public since 1971; however, it is now in private ownership. Use of Miller Airfield would require the extension and resurfacing of its runway facilities, as well as the refurbishing of its hangar and storage facilities. Kodiak Airport, if used at all, would function primarily as a personnel and freight transfer point. It is not envisioned that any facilities would have to be built at Kodiak Airport during the exploratory period.

Freight and personnel traffic arriving by air, to Kodiak support bases, would average, during the exploratory period, some 150 people and 8.07 metric tons (8.9 tons) of freight per month. The tonnage would represent foodstuffs, medicines, and other perishable items to be used by support base personnel. The amount of flights which would be caused by this traffic would be dependent entirely on the type of aircraft employed. Assuming that passengers are transferred at Kodiak Airport from jets to smaller aircraft (i.e., twin otters or large helicopters) and freight is brought directly to the support base some 12-15 flights per month could be expected to arrive at the Port Lions airfield. Helicopter flights from Port Lions to the exploration platforms are expected to number 60-90 per month.

Impacts on the Land Mode: Impacts occurring to the land transport systems of the Kodiak Archipelago, during this period, are expected to be insignificant. No continuous heavy truck traffic or overland passenger movement should occur.

Impacts on the Marine Mode: Marine transport impacts are expected to be only minor in nature. Some barge traffic would be required to transport equipment and construction materials necessary to upgrade the facilities at the air support bases. The barges would be no more than two or three in number. The unloading of these barges at either the Wakefield Cannery dock or a dock in Chiniak Bay would cause very short-term space use conflicts with the local fishing industry. As a result of the need to extend the Port Lions Airfield, somewhat more extensive impacts may be expected in that township. Barges carrying rock fill and armour rock will cause an approximate three or four month disturbance to fishing activities which occur in the vicinity of Port Lions.

Kodiak Island Developmental Period

In this period the probable focus of induced transportation system impacts would be the area in and around the city of Port Lions.

Impacts on the Land Mode: Due to the need to transport workers and material to construction sites, a road may be built from the terminus of the present road at the Port Lions airport to the oil terminal site at Talnik Point, and then along the pipeline corridors. This construction road would total 21 km (13 mi) and would have to be constructed before other onshore activities could commence.

Impacts on the Air Mode: By the beginning of the developmental period construction activities involving the Port Lions airfield would be completed. Incoming freight and passenger volume for the peak development year 1986 would total some 700-750 workers and approximately 41-45 metric tons (45 tons) of perishable commodities per month. The aforementioned traffic would involve 60-70 flights per month into the Port Lions airstrip. Heliocopter flights to the Shelikof Platforms from the Port Lions field should total some 90-120 flights per month.

Impacts to the Marine Mode: In the developmental period, at least 5 barges (2,000 short ton class) are expected to off load at the Port Lions Dock. These barges will contain such items as living quarters modules, onshore pipeline, construction machinery and materials. Additional marine traffic would be generated by barges carrying armour rock (the source of the armour rock could be Kizhuyak Point) for the construction of a breakwater for the Talnik Point facility and by petroleum barges carrying helicopter fuel. The barges transporting the armour rock would dump their freight directly on site.

Due to the barge traffic space use conflicts between the fishing and oil industry could occur at the Wakefield Cannery dock. Such conflicts would intensify during periods of peak fishing activity, but would terminate upon the completion of the Talnik Point oil terminal dock. Additional conflicts could occur due to the reduction of fishing opportunities in those areas which lay in the barges' traffic path.

Impacts Resulting from Production Activities

During the production phase, passenger numbers and freight tonnage should decline markedly from that of the development period. As a result of this reduced volume of incoming traffic impacts on the land, air, and water transport systems would also be reduced.

Vehicle traffic levels within the Port Lions area should fall to levels only slightly higher than those experienced during the pre-exploratory period. Vehicle levels above that which would be generated by local inhabitants would derive from freight traffic passing to and from the airport, pipeline service vehicles, and local trips by terminal personnel. Air traffic levels would be similarly diminished. Some 400-450 passengers and 21-24 metric tons (23-26 tons) of perishables could be expected to be deplaned at Port Lions during the average year of the production phase. This could translate itself to 24-39 flights per month into the Port Lions airport. Helicopter flights from the support base to the rigs could occur at a rate of 60 per month.

Marine impacts in the Port Lions area, during the production phase, are expected primarily in the form of tanker traffic passing to and from the Talnik Point facility. According to table II.B.1.a.-1 some 96.8 mmbbls of oil would be transported during the peak year from the sale 60 area. Half of this amount could be expected to be from the Talnik facility, using a carrier of the 100,000 dwt capacity, as a yardstick, it may be assumed one tanker would leave from Talnik Point every 6 days. The tankers would enter Kizhuyak Bay from the Gulf of Alaska via Marmot Bay. Fishing activities (especially crabbing) occurring in the path of the tankers could be disturbed; however, many of the conflicts could be avoided by observing a standard shipping schedule and a voluntary shipping lane.

Port Lions and/or Talnik Point is not viewed as having a role in providing marine support and supply activities in any of the three phases. Marine support vessels which might issue from Talnik Point would be infrequent, and probably due to emergency causes. The reason for this assumption is the treacherous nature of the climate and oceanography of Whale Passage (see section III.C.6.a). The navigational uncertainties are such that a timely and rigorous supply schedule, especially during the fall and winter months, could not be maintained without the acceptance of some risk.

Anchorage

Impacts which may occur to the transportation systems of Anchorage and the Kenai Peninsula would be entirely within the developmental phase of oil and gas activity.

As a result of sale CI, the corporations, involved in exploratory activities, have stockpiled significant amounts of mud, cement, and tubular goods on their Kenai staging yards. Due to this material surplus, the oil industry expects to be able to effect all sale 60 exploration without the importation of auxilliary supplies. Additional material would only be brought in as a result of the location of commercial quantities of hydrocarbons (Northern Resources Management, Monitoring Exploration Activities in the lower Cook Inlet, 1980). In the light of this fact, it is perceived that impacts on either the Anchorage or Kenai Peninsula transport links, derived from exploratory activities, would be entirely due to the transfer of workers and perishable commodities. Worker/passenger figures and tonnage devoted to foodstuffs would be similar to those entering Port Lions during this same period. Whereas, such a volume of traffic would cause a measureable impact on the Port Lions systems; it is believed that the forecast level of exploratory activity could be absorbed by the transport systems of the subject areas without significant affect. For this reason, the discussion of impacts accruing to the transport systems of Anchorage and the Kenai Peninsula will commence with the developmental period.

Impacts Resulting from Development Activities

A review of table IV.A.2.m.-1 reveals that 1986 is the year in which the maximum tonnage of mud, cement, and tubular goods would be brought into the State. A review of table B-4 also indicates that this same year would be also the one which may experience maximum sale 60 related employment.

Impacts to the Land Mode: Truck traffic generated by sale 60 related freight arriving at the Port of Anchorage would equal some 15 trips per day (30 round trips). In view of 1979 AADT (see table III.C.6.c.-1) and the recent improvements rendered to the Seward highway, south of Anchorage, truck traffic issuing from the Port of Anchorage would register no more than a minor impact to the road system.

Impacts to the Air Mode: Peak passenger/worker numbers would, during 1986, average some 900-950 individuals per month. This assumes that all labor is exogenous in origin. Such a labor force would generate as many as 50 flights per month from the Anchorage terminal. Given the carrying capacity of Anchorage International Airport, as outlined in section III.C.6.b., it is unlikely that proposed action would create any significant impacts on airport operations.

Impacts to the Marine Mode: In 1986 the total tonnage engendered by the proposed action and passing through the Anchorage Port would equal some 98,000

Table IV.A.2.m.-1
Bulk Tonnage Transportation Requirements for the Proposed Action

	Tonnage in Short Tons			Transportation -per year-		
Year	Pipeline[1]	Drill Casing[2] and Drill String	Mud[3] and Cement	Freighter[4]	Barge[5]	Truck Trips[6]
1985	57,420	---	---	5	29	3222
1986	75,240	10,511	13,584	9	50	5555
1987	25,740	17,287	19,355	6	32	3479
1988	---	17,037	18,681	3	17	1889
1989	---	17,037	18,681	3	17	1889
1990	---	17,037	18,681	3	17	1889
1991	---	406	445	---	---	47

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[1] Assume 184 lbs per foot for oil. Assume 116 lbs per foot for gas. (USGS/BLM-OCS, 1980.)

[2] Northern Resources Management, 1980.

[3] See Appendix A.

[4] Based on Sealand's standard containerized freighter class, the C-4 x 3 series.

[5] 2,000 ST Barges.

[6] 36,000 lb tandem rigs. One way trips.

tons. This tonnage is equivalent to 6 percent of the total cargo and 10 percent of the dry cargo handled by the Port of Anchorage. Total ship arrivals at the Port of Anchorage, at the peak of development, would vary according to mix of vessels used. A review of table IV.A.2.m.-1 reveals that use of containerized freighters would reduce the sale 60 traffic to some 4 percent of the freighter traffic experienced by the port in 1979.

Impacts Resulting from Production Activities

During the production phase of OCS activities total tonnage handled, vehicle traffic generated, and passengers transferred are expected to be an insignificant level when measured against the total Anchorage transport system.

Cook Inlet

Impacts Resulting from Development Activities

Impacts on the Land Mode: As a result of the proposed action, some 15 round trips per day by fully loaded tandem rig trucks could be expected on the Kenai Peninsula road system. A review of table III.C.6.c.-1 indicates that these additional trips would not significantly impact the total AADT for any affected road link. The truck traffic, if properly scheduled not to compete with peak hours of commuter or recreational traffic, would have little impact on the carrying capacity of the Kenai road system except to increase the long-term deterioration factor to which the Sterling Highway is exposed. However, should the material be transportated in surges rather than a steady flow, localized traffic congestion could be expected to occur around the Anchor Point construction site and near areas of prime recreational interest. It is assumed that any potential for traffic congestion would be limited to the summer months.

By 1986, significant vehicular traffic could be generated by the extensive hire of local citizens. A vigorous policy aimed at employing residents of Homer and Kenai would reduce impacts on the air transport systems by reducing the need to transport and exogenous work force. At the same time such a policy would result in further increase of the Sterling Highway AADT levels.

Impacts to the Air Mode: Assuming that either the airport at Homer or Kenai received the full brunt of an exgenously derived workforce (some 50 flights and 950 individuals per month), the ability of these airports to function properly would not be impaired. Although parking space, terminal facilities, and storage facilities for both airports are limited, it is expected that any OCS-related traffic would be promptly transhipped to its destination. In any event a review of section III.C.6.c. will evidence the fact that both Homer and Kenai have drafted airport expansion plans which should accommodate any proposed OCS development activity.

Helicopter support flights from logistics bases at Nikiski and Homer could total 120 flights or more per month.

Impacts to the Marine Mode: All mud, cement, and tubular would be shipped from bases located either in Kenai or Homer. Support boats transiting between the supply bases and offshore platforms are expected to average between 90 and 120 round trips per month during the peak of developmental activities.

No additional docks are expected to be built at Nikiski as a result of this proposed action; however, a one or two dock complex would be built at the Anchor Point terminal. Additional dock facilities would have to be constructed at Homer in order to facilitate any hypothesized logistics traffic. In regard to Homer, a port development plan has already been discussed and outlined in section III.C.5.

Impacts Resulting from Production Activities

During the production period logistics vessels would make some round trips per month. Oil tankers of the 100,000 DWT class will be expected to complete one trip every 6 days. This volume of tanker traffic would be expected during the maximum production period (1991-1993) and would be equal to 8 percent of all tanker/freighter trips registered in the Cook Inlet in 1977. Vessel trips required for carriage of LNG are expected to be part of the volume generated by the proposed Pacific LNG facility. Additional traffic from the proposed plant could be triggered by gas extracted as a result of the proposed action. The traffic flow from the proposed LNG plant, as well as its interrelationship with the proposal will be treated in this section under the heading of cumulative effects.

Impacts from the proposed action to the land and air modes would sharply decline during this phase and would reach insignificant levels when measured against the total traffic volumes of the Kenai Peninsula transport systems.

Conclusion: Impacts resulting from the proposal to all transport modes serving the town of Port Lions would be significant. Because of its undeveloped status, Port Lions would receive the greatest relative impact from the proposed action. The rate of traffic which Port Lions could receive during the least active of the OCS phases, that of production, would be substantially above levels currently experienced by the city.

Maximum conflict between OCS and Port Lions fishing activities are expected to occur during the developmental period. The potential conflicts will entail the temporary loss of fishing grounds in Kizhuyak Bay due to large traffic and construction activity. Space use conflicts should subside. However, loss of fishing grounds in the vicinity of Talnik Point, over the life of the proposal may result from this action.

Impacts to the transport system of Anchorage are seen as minor to insignificant for all phases of sale 60 activity except for the Port of Anchorage. Moderate impacts could be assumed for the Port of Anchorage during the development period due to a 6 percent increase in total cargo (over 1979 figures) handled and a possible substantial increase in barge traffic.

Impacts accruing to the Kenai transport systems would be minor to moderate in nature throughout the life of the proposal. The existing capacity of the Kenai and Homer airports would be adequate to manage all air traffic occurring in any phase of activity. Highways would suffer peak impacts during the developmental period. Localized congestion may occur from the poor timing of truck convoys and from commuter traffic. However, any congestion which would happen should be limited to summer months. Marine transport impacts are expected to be moderate in nature. Tanker traffic in the inlet would be increased by some 8 percent over 1977 levels.

Cumulative Effects: The expansion of the Port Lions small boat harbor should be complete by the developmental period of the proposal. In the event that both the boat harbor and the construction projects associated with sale 60 occur within the same timeframe, significant short term impacts could arise. Fishing vessels would have to compete with barges carrying armour rock, supplies, construction material, and rock fill. Congestion would probably occur and fishing activities within the vicinity of the construction projects would be sharply curtailed.

Spacing the projects so as to allow one to be completed before the commencement of another would do much to alleviate a potentially hectic and congested construction period.

The transportation systems of the city of Anchorage are such that each one of the proposed projects outlined in section IV.A.1.h. would individually at most create a minor to moderate impact. To significantly impact Anchorage, all of these projects would have to have their peak construction activities occur within or near the same year.

In regard to the Kenai Peninsula, the proposed action may be just one of a series of projects which will affect the peninsula throughout the 1980s. Successful drilling operations would ensure the continuing increase in use of Kenai Peninsula transport systems. This increase is ongoing and is expected to continue throughout the 1980's with or without the proposal.

A significant aspect of the proposed action may be an expansion of the envisioned Pacific Alaska LNG plant. The location of large reserves of natural gas may cause the emplacement of a third liquefaction train to the Pacific Plant. The third train would raise the liquefaction potential of the plant to some 600 mmcf per day and concommitantly increase the yearly number of LNG vessels issuing from the facility from 60 to 90 per year.

If recoverable hydrocarbons are found as a result of the State of Alaska lease sale 35, tanker traffic within Cook Inlet will increase by an unknown amount. Resource amounts have not yet been estimated by the State for the proposed sale 35 area.

Total tanker traffic caused by the proposed action may equal some 90 oil and LNG vessel trips per year. Tanker traffic generated from all other projects (see section IV.A.1.h.), with the exception of the lower Cook Inlet sale, could equal 120 trips per year.

Projected tanker traffic produced by sale CI is difficult to estimate. The volume and range of tanker traffic which may result from sale CI extends from 0 to more than twice that generated by the proposed action. Original resource estimates for sale LCI ranged from 900 MMbbls of oil to 2.8 Bbbls of oil. However, the continuing lack of success registered by exploratory drilling within the inlet has called the original resource estimates into doubt. As it stands, the inlet is due one more drilling effort and then oil industry action is expected to cease. Previous experience in regard to industry drilling operations in Alaska indicates that lack of success in the initial exploratory phase effectively stymies sustained drilling activities.

In short, with the exception of possible traffic from sale LCI, the proposal would be responsible for 30 to 40 percent of all tanker traffic generated during the next decade by presently proposed projects.

Unavoidable Adverse Effects: The unavoidable adverse impacts which may derive from sale 60 related activities are: 1) a substantial and permanent increase in the traffic volume experienced by all modes serving Port Lions; 2) short-term space use conflicts between fishing and OCS vessels; 3) loss of some fishing grounds in the vicinity of Port Lions over the life of the proposal; 4) localized traffic congestion on the Sterling Highway near construction areas; and 5) increase of tanker traffic in the Cook Inlet, Marmot Bay, and the Gulf of Alaska.

n. Impacts on the Alaska Coastal Management Program: Impacts of the proposal on the Alaska Coastal Management Program (ACMP) can be effectively identified and evaluated through the consistency provisions of the Federal Coastal Zone Management Act as amended (CZMA)(16 USC 1456, et. seq.). Refer to section I.D of this EIS for an explanation of the CZMA consistency provisions as they apply to the OCS leasing program.

Timing of OCS Sale 60 with Local CZM Plans: Both the Kenai Peninsula Borough (KPB) Coastal Management Plan (CMP), and the Kodiak Island Borough (KIB) CMP, are expected to be approved by the Alaska Coastal Policy Council by the end of 1981 or early 1982. This projection reflects scheduling and coastal management planning grants administered by the State Department of Community and Regional Affairs as well as a requirement in the Alaska Coastal Management Act that a district Coastal Zone Management program be adopted by December of 1981. Delays in this scheduling could occur.

Concern has been expressed that the local CMPs would not be in place before OCS sale 60 occurs, and that irretrievable decisions would be made to allow oil and gas development before local coastal management programs would be authorized to review such development. However, given the long lead times required for oil and gas development in frontier areas, coupled with the segmented nature of decisionmaking required in the Outer Continental Shelf Lands Act, the district CMPs should be authorized before significant oil and gas development decisions are made. The following calendar of prospective events and decisions is helpful in examining the above concern:

September 1981	Scheduled occurrence of OCS sale 60 (OCS 5-year schedule)
Fall 1981	Kodiak Island Borough and Kenai Peninsula Borough Draft CMPs completed and reviewed (Alaska Department of Community and Regional Affairs)
December 1981- January 1982	OCS exploration plans submitted and approved for operation in sale 60 tracts; CZMA consistency review (BLM/OCS estimates)
December 1981- February 1982	District CMPs adopted by State of Alaska and authorized for consistency review (Alaska Department of Community and Regional Affairs)

1984	Development and production plan EIS submitted and approved (if commercial fields are found) (BLM/OCS Petroleum Development scenario)
1984	Development and production plans submitted, CZMA consistency review and approval by USGS, BLM-IPP transportation management plan completed. (BLM/OCS estimates)
1985-1987	Construction and installation of OCS field development infrastructure, platforms, pipelines. (BLM/OCS Petroleum Development Scenario)

A review of this schedule shows the district CMPs would be authorized concurrently with the sale 60 OCS exploration plan approvals. If the CMPs were approved by the State before 1982, OCS sale 60 exploration plans would have to be consistent with the CMPs. The CMPs would clearly be authorized (1982) prior to the submittal of the development and production plan EIS (1984), the USGS development and production plan submittal (1984), and the BLM-IPP transportation management plan (1984).

The KIB and the KPB may not have their CMPs authorized by the time of the sale 60 exploration plan consistency review. According to the estimated schedule, the review of sale 60 exploration plans for consistency with the approved State Coastal Management Plan (as well as local CMPs) should occur in the winter of 1981-1982 (perhaps December through February depending upon the time of submittal). Both of the Borough plans should be completed at this time to provide a basis for any local consistency findings with the OCS exploration plans under review. The Boroughs' consistency concerns, if any, could be forwarded through the approved ACMP so the OCS exploration plans could be subject to local CMP policy concerns.

It should be emphasized that the occurrence of any OCS lease sale itself is not the final governmental decision regarding oil and gas development.

The Outer Continental Shelf Lands Act (OCSLAA) provides for OCS lessees to submit and gain approval on exploration plans and later on development and production plans. Moreover, the OCSLAA provides authority for BLM to regulate pipeline locations for OCS hydrocarbons; OCS lessees must obtain a right-of-way permit from BLM if pipelines are to be laid on the continental shelf. Other Federal agencies, as well as State agencies, would be involved in regulating OCS operations subsequent to OCS lease sales.

Thus, the local CMPs would have significant opportunities to comment on, participate in, and review governmental decisionmaking regarding OCS operations subsequent to a lease sale. The OCS exploration plans are the very first step; the application of other regulations and plan requirements would occur subsequent to exploration plan approvals. The KIB and KPB CMPs are expected to be authorized before the subsequent decision points.

Kenai Peninsula Borough-District Coastal Management Program: The proposal is not expected to adversely effect the integrity of the District Coastal Management Program (CMP). The borough's program is being developed and is expected to be approved by the State Coastal Policy Council in fall of 1981. If the proposed lease sale occurs in September, 1981 as scheduled, then it will have occurred before the borough's CMP is approved by State.

In the absence of an approved district CMP for the Kenai Peninsula Borough (KPB), some assumptions can be made in this EIS to provide for an impact assessment of borough energy facility siting policies. It should be recognized the following analysis does not constitute a) a consistency determination under provisions of the ACMP or, b) an impact assessment of proposed OCS related onshore facilities in the borough's coastal zone. Instead, the assessment is of petroleum development scenario assumptions accompanying this leasing proposal against hypothetical energy facility siting policies of a KPB-CMP.

Assume that a) the energy facility siting policies of KPB sponsored studies mentioned in section III.D.2.d. above are officially incorporated into the borough's CMP and that, b) the district CMP is adopted by the State legislature. The proposal's onshore facility siting scenario for an exploration case and a development case for commercial finds of hydrocarbons is identified in section II.B.1.a. A comparison of this section and section II.B.1.a. shows that the siting scenarios of the proposal and the assumed policies of the borough CMP are compatible. Specifically:

> The proposal assumes exploration support activity will occur out of Nikiski and Homer on the Kenai Peninsula. These facility locations have been identified in borough sponsored studies as suitable for serving energy development needs.
>
> The proposal assumes an oil terminal and processing facilities at Anchor Point-Cape Starichkof. This is consistent with borough sponsored studies which have identified this area as suitable for a deep water port and OCS related industrial development.
>
> The proposal assumes a gas pipeline extending from an offshore pipeline landfall (between Cape Starichkof and Anchor Point) to the present liquefaction facilities at Nikiski. This aspect of the proposal is not reflected in the borough sponsored studies. Hence, the gas pipeline part of the scenario could be considered inconsistent with the findings of the borough studies. However, these studies did not address the issue of pipeline transportation, generally, as witnessed by the lack of discussion of existing oil and gas pipelines in the upper Cook Inlet and on Kenai Peninsula.

Kodiak Island Coastal Management Program: The Kodiak Island Borough (KIB) CMP is in the same situation as the Kenai Peninsula Borough program; it is in progress, has yet to be completed, and the proposed lease sale is expected to occur before the program would be officially adopted by the State Coastal Policy Council.

The petroleum development scenario accompanying the proposal includes a submerged pipeline through the Kupreanof Strait with the pipeline landfall at Cape Chernof, an onshore pipeline from Cape Chernof to Talnik Point on Kodiak Island, and an oil terminal at Talnik Point. Port Lions could function as a logistical support center and provide infrastructure for the terminal and/or processing facility operations at Talnik Point. See section II.B.1.a of this EIS regarding scenario assumptions and descriptions

The consistency of the proposal's petroleum development scenario with energy facility siting policies of a KIB district CMP could be hypothetically evaluated, similar to the evaluation above for the Kenai Peninsula Borough. However, deriving energy facility siting policies from KIB's sponsored studies is more difficult for the Shelikof Strait portion of the proposed sale area: The borough's one study on oil terminal and marine service base sites (Woodward/ Clyde Consultants, 1977) was predicated on a western Gulf of Alaska rather than a Shelikof Strait lease sale. The borough acknowledges that its siting must be updated to include the Shelikof Strait and Chiniak Bay areas for proposed OCS sale 60: It has submitted applications for funding assistance under the Coastal Energy Impact Program for new facility siting studies in the Shelikof Strait and Chiniak Bay areas.

For the KIB, some goals and objectives statements have been adopted as official policy. The KIB policy statements call for OCS-related facilities to be sited away from the "population centers of Kodiak Island" and "be self-sustained at their remote sites." Refer to section III.D.4.b. above. Based upon these policy statements, the Shelikof Strait petroleum development scenario could possibly be considered inconsistent with KIB hypothetical energy facility siting policies, as it hypothesizes the location of facilities near populated areas.

The marine terminal is proposed at Talnik Point, which is only 3 miles from Port Lions, and approximately 1 mile from the Port Lions airfield. The Port Lions community and its infrastructure could be used to support the oil terminal operations. However, this interaction and possible adverse impact on Port Lions could not be determined until an OCS lessee submits a petroleum development plan after a commercial find of hydrocarbons (oil) in Shelikof Strait. Moreover, it is unclear whether the borough policies identified in section III.D.4.b. refer to outer lying settlements such as Port Lions.

Proposed Area Meriting Special Attention: Section III.D.3.b. and c. identifies a proposal for Area Meriting Special Attention (AMSA) designation under the ACMP in the Kenai River Plats AMSA proposed by the USFWS and ADF&G. The AMSA has not been officially acted upon by the Alaska Coastal Policy Council. There is no specific coastal management policy authorized for the proposed AMSA area beyond the general policies and standards of the ACMP.

Assuming the proposed AMSA's were adapted by the Alaska Coastal Policy Council, the siting of a gas pipeline through the Kenai River Flats area could pose a moderate impact. If the pipeline were sited through the AMSA "Natural Area Zone," this would have to be designed and constructed in a manner compatible with USFWS recommendations (U.S. FWS, 1979). The FWS AMSA proposal would allow "oil and gas operations" in this zone. Refer to figure III.C.5.c.-2 for a delineation of this zone. This EIS presumes that a buried gas transmission line would qualify as "oil and gas operations" under the U.S. FWS AMSA proposal. Alternatively, the gas pipeline could be sited in a corridor to the east of the proposed AMSA "Natural Area Zone;" such a corridor would obviate any impacts upon an adapted AMSA which was incorporated into the approved ACMP.

Both the Kenai Peninsula Borough (KPB) and the Kodiak Island Borough (KIB) CMP's, will likely be incorporated into the State ACMP before significant post-lease sale activities requiring Federal consistency review.

Conclusion: The proposed lease sale would have no adverse impacts on the approved ACMP. The proposal's development scenario would not adversely affect the draft KPB CMP. In the case of the KIB CMP, the proposal's development scenario for an oil terminal at Talnik Point could conflict with and adversely affect adopted KIB goals and objectives on OCS facility siting. KIB policies and coastal management planning have not advanced sufficiently to determine whether other aspects of OCS exploration, development, and production would otherwise adversely affect the Borough's coastal zone. The scheduling of the KIB CMP indicates that it should be authorized before significant post-sale production and development decisions.

Cumulative Effects: Cumulative effects on the State ACMP are difficult to identify because of the procedural, rather than the site-specific, orientation of the state program. If tangible and discrete development proposals for a particular region or location of the coastal zone are known and subject to the governmental permit reviews, then some comparisons against the guidelines and standards of the State ACMP can be performed to identify possible cumulative effects in the absense of an approved local CMP.

The major projects identified in IV.A.1.h. will, for the most part, affect the KPB rather than the KIB. These projects may be considered to not cumulatively and adversely affect the KPB district CMP because the Coastal Management Program is designed, among other purposes, to provide for suitable development uses of the coastal zone. On the other hand, these projects may impose cumulative adverse effects because certain manifestations may not be compatible with the district CMP policies and site-specific uses which are presently not specified. Thus, the determination of cumulative adverse effects of these other major actions turns on their suitability for land and water uses of the KPB coastal zone. Since this determination is beyond the scope and authority of this proposed leasing action, no cumulative effects can be definitely identified or reasonably anticipated at this time.

One possibility of cumulative adverse effects on a KPB district CMP is various development activities proposed for, or impacting on, the Homer spit and land/water uses in Kachemak Bay. The utilization of the Port of Homer for an OCS exploration and development support center, in conjunction with other developmental uses (e.g., bottom fisheries development, general goods movement, recreational and commercial fishing vessels moorage and transit, and the Bradley Lake hydroelectric project), could cumulatively and adversely affect the Homer spit portion of the local zone. However, the "Area Meriting Special Attention" designation under the ACMP could provide satisfactory mitigation through management practices to the several developmental proposals for the Homer spit.

The possibility of cumulative adverse effects upon the KPB district CMP for the Homer spit area derives from concerns raised specifically by the KPB CMP. Moreover, the concerns refer to known development proposals in specific locations. In contrast, most of the major projects mentioned in section IV.A.2.n. are in the planning stage, but lack specificity for purposes of cumulative effects assessment on coastal zone management.

Unavoidable Adverse Effects: The leasing proposal would not likely result in any unavoidable adverse impacts upon either the Alaska Coastal Management Program, the Kenai Peninsula Borough District CMP, or the Kodiak Island Borough CMP.

o. Impacts on Water Quality: Environmental impact assessment of drilling fluid disposal upon marine receiving waters has been described in the appendices to three separate EISs: FEIS on OCS sale 65 (BLM, 1978), Final Supplement on the EIS on OCS sale 42 (BLM, 1979), and the FEIS on the proposed Five Year OCS Oil and Gas Lease Schedule (BLM, 1979). These appendices are incorporated by reference to this section on water quality impacts pursuant to CEQ regulations implementing NEPA (40 CFR 1502.21; 43 FR 55978).

Types of Wastewater Discharges

Drilling Muds: Offshore exploratory and development well drilling involves use of drilling muds which are discharged periodically from the platforms. Quantities of discharged mud depend upon well depth, hole size, geologic formations encountered, mud dispersability, and solids control capability (API, 1979).

Because these parameters affect the discharge characteristics, it is difficult to define a "typical" mud system and discharge profile; however, available literature has been generated which describes different types of mud operations (EPA, 1976; EPA, 1977; Otteman, 1976; Dames and Moore, 1978; Ecomar, 1978).

Two major categories of contaminants in drilling muds are trace metals and bacteriocides (NOAA, 1979a; Adams, 1978; BLM, 1979). A third major pollutant category would be oil and grease, if an oil based mud system is used (EPA, 1976a).

Bacteriocides vary in terms of composition in drilling muds. These may include aldehydes, chlorinated phenols, quaternary amines, diamine salts, and other substances (Adams, 1978; EPA, 1977). The discharge concentrations of these compounds individually could range from 300 to 30,000 parts per million (ppm) depending upon the mix of bacteriocides in drilling fluids (EPA, 1977).

Produced Waters: If commercial finds of hydrocarbons are made in OCS sale 60, oil production from individual platforms will require separation of any formation waters or brines found in the petroleum bearing reservoir. The formation waters contain several toxic substances, both trace metals and aromatic hydrocarbons. The constituent toxic elements and their concentrations in formation waters vary with the geologic province encountered. A review of available data on typical formation water toxic constituents reveals that the Ni, Cu, Zn, and Ag metals exceed established Federal water quality criteria (Clark, 1979; Rittenhouse, et. al., 1969; EPA, 1975). The Offshore Operators Committee, upon reviewing available literature, found that only the metals Cu, Cr, Mn, and Sr appear to have concentrations in produced waters greater than that normally found in sea water (Sheen Technical Subcommittee, 1975).

Information on aromatic hydrocarbon concentrations in produced waters is difficult to identify. The Offshore Operators' Committee estimates that dissolved hydrocarbons may vary up to 50 ppm. The U.S. EPA Development Document for the New Source Performance Standards for the Offshore and Gas Extraction

Category did not estimate dissolved hydrocarbons as a waste constituent in produced waters (U.S. EPA, 1975). Instead, the EPA estimated non-dissolved oil and grease concentrations. These vary from 7-1300 ppm in Lousiana offshore platforms and from 56-359 ppm in offshore California platforms.

Other Discharges: Offshore exploratory vessels and platforms routinely discharge treated sanitary wastes, ballast water, blowout preventor fluids, water distillation blowdown fluids, and deckdrain wastes. The rates of discharge vary with the size of the vessel or platform and the extent of drilling production and operations. The movement of OCS petroleum by tankers also results in ballast water releases which includes dissolved aromatic hydrocarbons. These ballast water releases were uncontrolled until recent years when requirements of the Clean Water Act, the Ports and Waterways Safety Act, and the Port and Tankers Safety Act imposed restrictions (see below).

Dilution and Transport Characteristics in Receiving Waters

Drilling Muds: Of the literature available on the fate and effects of drilling fluids in the marine environment, the topic of dilution, dispersion, and transport of mud contaminants in the water column has generally received greatest attention. Table IV.A.2.o.-1 summarizes data from representative field studies regarding dilution of drilling fluids in marine receiving waters. As summarized in table IV.A.2.o.-1, the continuous low level discharges of drilling fluids (10-20 bbl/hr) will dilute by factors of 10^4 (10,000:1) or 10^5 (100,000:1) within 200-300 meters of the discharge source. These dilution rates refer to total suspended solids or rhodamyne dye as a tracer. Background concentrations for suspended solids were reached within 100-280 meters. Few studies have actually monitored the trace metal contaminants in receiving waters of OCS platforms discharges (Ecomar, 1978; Endeco, 1976; Zingula, 1975). Of these studies, the trace metal dilution rates appear to be on the same order of magnitude of those for whole mud as measured by suspended solid concentrations.

Produced Waters: There is scarce information on the dilution and transport characteristics of the constituents of produced waters. Monitoring studies have been done to identify general water column chemistry around OCS waters, but inferences must be drawn as to the source of discharge. Comparison of the treated produced water constituent concentrations with applicable water quality criteria and background concentrations, where available, produces some estimate of the necessary dilution ratio. These dilution ratios can then be compared with the measured dilution properties in the two Cook Inlet rig monitoring studies.

Table IV.A.2.o.-2 displays the concentrations of various toxic substances, both trace metals and petroleum hydrocarbons, contained in treated produced water discharges. The discharges are from onshore production facilities serving several offshore production platforms in upper Cook Inlet. The level of produced water treatment provided at these facilities is comparable to that expected for treatment of produced waters from OCS sale 60. Discharge levels of most of the toxic trace metals are already close to the applicable receiving water criteria. However, some trace metals would need an order of magnitude (10^1) dilution. The aromatic hydrocarbon compounds sampled required at least one or two orders of magnitude dilution (10^1 or 10^2) in order to meet hypothetical water quality criteria for the individual hydrocarbon compounds.

Table IV.A.2.o.-1

Dilution Rates of Drilling Discharges from Offshore Oil and Gas Platforms 1/

Study Location	Discharge Specifications 1/		Dilution Characteristics 2/			Hydrographic Data 3/			Study Author
	Total Suspended Solids mg/l	Rate bbl/hr	Dilution Rate	Distance: from Source	Distance to: Background Level	Depth of Sampling	Prevailing Current (knots)	Ocean Depth	
Georges Bank, off New England	280,980	5.5	a. 7.4×10^4	10 m	10 m	0-150 ft	1.3 S	157 ft	Endeco, 1976
		16.5	b. 9.3×10^4	280 m	280 m	0-150 ft	0.8 N	157 ft	
S. Timbalier, Block 54, Gulf of Mexico	350,000	NA	a. 1.26×10^3	0	200 m	surface	NA	18.4 m	Zingula, 1975
		NA	b. 8.75×10^3	92 m	200 m	surface	NA	18.4 m	
		NA	c. 3.18×10^5	202 m	200 m	9.2 m	NA	18.4 m	
Tanner Bank, off southern California	250,000	10	a. 5.1×10^2	2.3 m	100-200 m	5-15 m	0.4 NW	63 m	Ecomar, 1978
		10	b. 4.8×10^4	100 m	100-200 m	5-15 m	0.4 NW	63 m	
		10	c. 1.2×10^5	200 m	100-200 m	5-15 m	0.4 NW	63 m	
Redoubt Bay, #1: Cook Inlet	60,000	60	a. 1×10^5	38 m	NA 4/	1 m	6.8 (ebb)	122 m	NALCO, 1976
	ppb	60	b. 6.2×10^4	45 m	NA 4/	1 m	2.4(flood)	122 m	
	dye 4/	60	c. 8.2×10^4	600 m	NA 4/	1 m	NA(slack)	122 m	
		60	d. 1×10^5	500 m	NA 4/	12.3 m	variety	122 m	
Lower Cook Inlet	20,000	20	a. 1.5×10^3	100 m	100-200 m	7 m	0.6-1.91 NE	NA	Dames and Moore, 1978
		20	b. 2.5×10^3	200 m	NA	15 m	0.6-1.91 NE	NA	
	1.1×10^5	20	a. 3.8×10^4	100 m	NA 4/	1 m	0.6-1.91 NE	NA	
	ppb dye 4/	20	b. 1×10^5	200 m	NA 4/	1 m	0.6-1.91 NE	NA	

1/ Discharge specifications refer to whole mud concentrations with the exceptions of the Dames and Moore study which shows total suspended solid (TSS) concentrations after dilution by flushing water.

2/ Dilution characteristics describe the relative concentration of the suspended solids or dye at specified points in the receiving water column. The dilution rate represents the reported receiving water concentration divided into the concentration of TSS or dye in whole mud. Distance to background levels indicate the distance necessary for the effluent plume to mix with receiving waters to yield the natural or pre-existing concentrations of TSS.

3/ Hydrographic data provides some means of comparing the results of the plume dilution rates in different locations. Depth of sampling indicates the extent of the water column sampled as the basis for reporting TSS concentrations in receiving waters.

4/ The two Cook Inlet studies used rhodamyne dye, as a tracer for drilling mud plume dispersion. Because there is no natural background level for this substance in receiving waters, no distance to background level estimate is prepared.

Table IV.A.2.o.-2
Discharge Concentrations of Treated Production Waters in Upper Cook Inlet and Necessary Dilution to Water Quality Criteria

Toxic[1] Substance	ARCO Granite Point Facility[2]		Marathon Trading Bay Facility[3]	
	Discharge Concentrations mg/l	Dilution to[4] Water Quality Criterion	Discharge Concentrations mg/l	Dilution to[4] Water Quality Criterion
Trace Metals				
Silver	0.05	10^{-1}	0.03	10^{-1}
Arsenic	0.05	0	0.02	0
Cadmium	0.04	10^{-1}	0.28	10^{-2}
Chromium	0.14	0	0.57	10^{-1}
Copper	0.05	0	0.18	10^{-1}
Mercury	0.002	10^{-1}	0.0001	0
Nickel	0.05	0	1.1	10^{-1}
Lead	0.20	10^{-1}	0.2	10^{-1}
Antinomy	0.14	0	0.026	0
Selenium	0.01	0	0.017	0
Zinc	0.05	0	0.11	0
Petroleum Hydrocarbons[5]				
Benzene	1.3	10^{-2}	1.2	10^{-2}
Toluene	0.05	10^{-1}	0.48	10^{-2}
Ethylbenzene	0.05	0	NA	NA
Xylenes	0.10	10^{-1}	0.48	10^{-1}
Trimethybenzenes	0.50	10^{-1}	0.13	10^{-1}
Naphthalene	0.10	10^{-1}	0.16	10^{-1}
Methylnapthalenes	0.20	10^{-1}	0.15	0
Dimethylnapthalenes	0.50	10^{-2}	NA	NA
Trimethylnapthalenes	0.50	NA	NA	NA
Oil and Grease	4.2	0	2.0	0

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[1] Toxic substances identified are those listed by U.S. Environmental Protection Agency pursuant to section 307(a)(1) of the Clean Water Act, as amended. Other metals exist in petroleum formation waters, however, these are not included in the list of toxic substances.

[2] The ARCO separation and treatment facility at Granite Point treats unprocessed petroleum liquids from platforms Spark and Texaco-Superior. Platform A and receives separate produced waters from Amoco and Mobile offshore production platforms. As of December 1979, the facility discharged an average 314,000 gallons (7476 bbl/day) of treated wastewaters.

[3] The Marathon separation and treatment facility at Trading Bay receives unprocessed petroleum liquids from Dolly Varden, Grayling, King Salmon, and the monopod platforms. As of December 1979, the facility discharged an average of 2,878,000 gallons (68.524 bbl) of treated wastewater a day.

[4] Dilution to water quality criterion refers to orders of magnitude reduction in the reported discharge concentration before it is less than or equal to the applicable U.S. EPA water quality criterion (U.S. EPA, 1976).

[5] There are no water quality criteria for individual aromatic hydrocarbon compounds Refer to section III.E. regarding water quality criteria for petroleum hydrocarbons. Hypothetical criteria have been derived from 96-hour LD50 bioassay work on first Instar zoeae (larval stage) of dungeness crab. A 0.01 decimal fraction of the reported LD50 value was used in accordance with U.S. EPA and Alaska DEC water quality criteria for petroleum hydrocarbons. Data source: Caldwell, Calderone, and Mallon in Wolfe, 1977.

Sources: Arco Oil and Gas Company, "NPDES Permit Application: Granite Point Production Facility," 1980. Marathon Oil Company, "NPDES Permit Application: Trading Bay Production Facility," 1980.

Other Discharges

There is paucity of data on dilution and transport in marine receiving waters from routine low level releases of sanitary wastes, dissolved solids, and other pollutants discharged from offshore platforms. In the absence of evidence to the contrary, suspended solids and sanitary wastes are presumed to be diluted and transported in marine receiving waters similarily to whole drilling mud discharges discussed above. There is a paucity of data on dilution rates expected from routine low level releases of petroleum hydrocarbons from offshore platforms, aside from the discharges discussed above with regard to formation waters (Malins, 1977; EPA, 1976a).

Sedimentation: Several studies have been conducted of the trace metal accumulations in bottom sediments from drilling mud discharges associated with offshore platforms and exploratory vessels operating in the Gulf of Mexico and offshore southern California (Marine Technical Consulting Services, 1976; Continental Shelf Associates, 1975; Continental Shelf Associates, 1976; University of Texas, 1977; Dames and Moore, 1978; Mearns and Moore, 1978; Ecomar, 1978; and NOAA, 1977). Summary results of these studies are presented in table IV.A.2.o.-3.

The studies clearly show a rise in sediment concentration of the trace metals listed. General patterns of increases in trace metals concentrations are not evident given the variables of particle size and composition, depth, circulation, velocity, and direction. However, the data in table IV.A.2.o.-3 does show an affected reach of particle deposition on the sea floor from the platform sources. The affected reach can be as small as 200 meters and as large as 1,000 meters. Two key factors affecting the distance of particle deposition on the sea floor are discharge depth from the sea surface and prevailing current speeds (Adams, 1978; Dames and Moore, 1978; BLM, 1979).

The elevated levels of trace metals found in bottom sediments can be at least three times the background concentrations if immediately below the drill rig (Marine Technical Services, 1976; University of Texas, 1977; Ecomar, 1978). Results from the second year (1977-78) of the four year EPA/NOAA environmental study of the Buccaneer oil/gas field in the Gulf of Mexico indicate there are trace metal gradients decreasing away from the platform structures in surficial sediments, and there are elevated concentrations of Ba, Pb, Sr, and Zn in surficial sediments within 180 meters of the structures (Anderson & Shwarzer, in press). The BLM New Orleans OCS Office sponsored investigations around twenty production platforms in the Central Gulf of Mexico, revealed that trace metal concentration gradients of Ba, Cd, Cr, Cu, Pb, Ni, and Zn decreased with distance from platform structures. Several species of shrimp, flounder, and snapper, as well as other fish and benthos were analyzed for trace metals, but no evidence of bioaccumulation was found (Tillery, 1979).

Drill cuttings are significantly cleaner than drilling muds since they are larger in particle size, thus providing fewer sorption sites per unit volume. Drill cuttings may accumulate on seafloors where bottom transport currents are low enough. However, in the case of the Cook Inlet COST well monitoring study, which occurred during swift current conditions, no cutting accumulations were discernible. Bottom sediment cores contained only 0.5 percent cuttings of the total core sample at 500 meters and only 0.2 percent cuttings at 100 meters from the discharge platform (Dames and Moore, 1978).

Table IV.A.2.o.-3

Trace Metals in Bottom Sediments Subject to Offshore Oil and Gas Drilling Operations

Location	Trace Metal	Predischarge Levels 1/ (ppm)	Post-Discharge Levels 1/ (ppm)	Distance of Area Affected 2/ (meters)	Author
Offshore					
Texas					
Flower Garden Bank	Ba	50-1,300	46-7,800	300	Marine Tech. Consulting, 1976
Baker Bank	Ba	344-419	678 max	1,000	Continental Shelf Assoc., 1976
			1,618 max	500	
Stetson Bank	Ba	609-658	803-2,763	300	Continental Shelf Assoc., 1976
South Texas OCS	Ba	100 max	500 max	NA	University of Texas, 1977
	Zn	65 max	200 max	NA	
	Cd	0.07 max	0.61 max	NA	
	Pd	7.6 max	20.5 max	NA	
Onshore Alaska					
Lower Cook Inlet	Ba	560-660	640-760	400	Dames and Moore, 1978
Offshore					
S. California					
Santa Barbara Channel 3/	Zn	68, 61	61, 61	240	Mearns and Moore, 1978
	Cu	14, 12	9.8, 9.8	240	
Tanner Bank	Ba	45-156	161-1,680	240	Ecomar, 1978
	Pb	0.60	0.76-9.9	240	
	Cu	0.70	0.5-6.11	240	

1/ Pre- and post-discharge levels of pollutants are derived from a secondary data source for the offshore Texas studies (BLM,1979). Hence, the characteristics of data collection may vary. Sediment data collected from sediment traps can be less than from grab samples (Ecomar, 1978). Also, some of the studies may have sampled "predischarge" values for trace metals through control locations during or after drilling discharges rather than actually sampling sediments before drilling operations commenced.

2/ Distance of area affected does not necessarily reveal the reach of sediment deposition from the offshore platforms. The distance figures instead reflect the sampling area (i.e., transect distance from the source), the distance to peak trace metal reported concentrations, or the distance to trace metal concentrations above the reported background).

3/ The Santa Barbara Channel study evaluated sedimentation rates from two different platforms. Trace metal concentrations shown by pollutant and by monitoring period represent the mean sample value of observations rather than the range.

Petroleum hydrocarbons in bottom sediments have been subject to few investigations. An analysis of two producing platforms in the Santa Barbara Channel reveals elevated levels of total hydrocarbons in the bottom sediments around the platforms. However, the authors infer that the major source of petroleum hydrocarbons sediments are from natural oil seeps in the channel rather than from platform discharges (Mearnes and Moore, 1976).

OCSEAP sponsored reasearch has reported on suspended and surficial sediment concentrations of hydrocarbons in the Cook Inlet and Shelikof Strait areas (Cline, Bates, and Katz, 1980). The sampling stations were not located in upper Cook Inlet near production platforms. The sampling results typically showed odd carbon numbered alphatic hydrocarbons indicative of terrigenous sources, with exceptional stations showing hydrocarbon of marine planktonic sources. None of the hydrocarbon sediment sampling indicated anthropogenic or petrogenic hydrocarbons sources. Total saturated hydrocarbon concentrations sampled were in the low ppm (0.7 to 8.4 ug/g) across all sampling stations.

Conclusion: OCS exploratory vessels and platforms would be discharging drilling fluids in bulk quantities, along with low levels of petroleum hydrocarbons, sanitary wastes, and suspended solids from their wastewater discharge sources. Additionally, OCS production platforms would be discharging bulk quantities of formation waters. Releases of drilling fluids and petroleum hydrocarbons could kill and/or contaminate some species of fish and other aquatic life within 1-100 meters of the discharge source. The exact distance of the affected receiving waters cannot be quantified without specific data on the discharge rate and oceanographic conditions in receiving waters around the discharge source.

Cumulative Effects: The discharged wastewaters from OCS operations on the Cook Inlet and Shelikof Strait could result in the eventual accumulation of trace metals and petroleum hydrocarbons in the water column and bottom sediments of the in localized areas around the source of discharge. Refer to the discussion in section IV.A.2.b. regarding chronic effects of OCS discharges on marine biota. The cumulative loading of these contaminants from various sources besides OCS operations could deteriorate existing water quality. However, there is no evidence to date that drilling operations and production in upper Cook Inlet have deteriorated ambient marine water quality in Cook Inlet.

Unavoidable Adverse Effects: The short term and cumulative effects of contaminant releases associated with OCS operations are avoidable. Control strategies can be devised to minimize the releases of contaminants, or to prohibit the release of contaminants, either by process removal, or in the case of drilling fluids, by the selection of less toxic or nontoxic drilling fluid components. Unavoidable adverse effects would include the possibility of chronic effects to marine biota from contaminant releases from offshore drilling and production operations. However, there is no evidence to date to indicate that this chronic adverse effect is probable due to OCS operations.

p. Impacts on Air Quality:

Offshore Emissions Sources: Air emissions from OCS exploration, development, and production could be anticipated. Precise quantities of emissions by criteria pollutants, the location of emissions sources on the OCS, and the estimated onshore impacts on air quality are presented in this EIS. However, this air quality impact analysis proceeds from a set of assumptions which may not occur with the actual post sale exploration and production operations.

Representative air emissions have been compiled from an OCS exploratory vessel operating in the sale CI tracts and a production platform operating in State waters of the upper Cook Inlet. Emissions from Odeco's Ocean Bounty drilling vessel constitute the representative OCS emissions profile from an individual exploratory drilling operation (Phillips Petroleum, 1978). Emissions from platform Baker constitute the representative emissions profile from an offshore production phase operation (Dames and Moore, 1979). Emissions data from these two representative sources are shown in table IV.A.2.p.-1.

Simulated air quality concentrations have been calculated and are displayed in Table IV.A.2.p.-2 from these representative OCS emission sources. Several assumptions, which are explained in the footnotes, have been used in estimating the onshore air quality conditions displayed in table IV.A.2.p.-2. Key considerations in these assumptions are distance of the offshore source from the onshore receptor point and prevailing meteorological conditions. The assumptions collectively represent a worst case of a) the emissions source being located in an OCS tract nearest to the coastline, b) prevailing wind directions blowing towards the shoreline, and c) annual average wind speeds matching the worst case wind direction.

Other offshore emissions sources associated with OCS exploration and production are geophysical survey vessels, supply vessels, pipelaying barges, and other types of marine vessels servicing OCS exploration and development. Air emissions from these sources consist of exhaust combustion from engines and are considered insignificant (EPA, 1977; Battelle Pacific Northwest Laboratory, 1979).

Onshore Emission Sources: Possible onshore emission sources ensuing from OCS development would include a marine oil terminal, a liquefied natural gas (LNG) plant, loading operation of oil tankers and LNG vessels, processing facilities, and onshore facilities construction. The exact types of facilities, their location, and magnitude of operation cannot be predicted at this time. Refer to section II.B.1.a. for description of the petroleum development scenario.

Emissions and air quality estimates for a LNG plant proposed at Nikiski were prepared by Pacific-Alaska LNG Associates (Dames and Moore, 1979). Data on estimated maximum ambient concentrations from the Pacific-Alaska LNG facility are presented in table IV.A.2.p.-3. Unfortunately, no air quality simulations for a marine oil terminal operation of comparable scale to the proposal are available. There is an existing marine oil terminal at Drift River on the west side of the Cook Inlet. The emissions inventory for the Drift River terminal operation is comparable to that of platform Baker shown in table IV.A.2.p.-1. However, no ambient air quality monitoring has been performed at the terminal, nor is any simulated air quality analysis for the terminal available (personal communication, 1980).

A third category of onshore emissions sources ensuing from OCS development in Cook Inlet would be pumping stations for a gas pipeline extending from the coastal landfall to the liquefaction facilities at Nikiski. This category of onshore emissions would be insignificant.

Table IV.A.2.p.-1
Representative Air Emissions Inventory
From an OCS Exploratory Vessel and Production Platform 1/

Criteria Pollutant 2/	Exploratory Vessel 4/ gr/sec 3/	Exploratory Vessel 4/ tons/yr 3/	Production Platform 5/ gr/sec 3/	Production Platform 5/ tons/yr 3/
Carbon Monoxide	2.71	94.33	3.77	131.10
Reactive Hydrocarbons	0.99	34.36	2.57	89.37
Nitrous Oxides	12.48	433.94	15.81	549.79
Sulfur Dioxides	1.07	37.05	3.27	113.65
Particulates	1.67	58.23	0.32	31.99

1/ The emission data are taken from specific facilities operating in OCS areas off Alaska. The emission rates are summed across all sources on the exploratory vessel or production platform. Emissions from only one exploratory vessel source (the Ocean Bounty) operating in Alaskan waters were permitted before USGS promulgated its OCS air quality rules. Regarding emission estimates from production platforms, the selected instantaneous emission rates in this table can be compared against the following range of values for existing platforms operating in upper Cook Inlet. For sulfur oxides, the low emission rate was 1.24 gr/sec, while the high rate was 6.27 gr/sec at the time of reporting. For nitrous oxides, the low emission rate reported was .073 gr/sec, while the high rate reported was 0.42 gr/sec. Data source is Dames and Moore, 1979.

2/ The "criteria pollutants" included here are those which are regulated by USGS authority on OCS emissions sources.

3/ Emission rates are expressed in either grams per second (gr/sec) or tons per year (tons/yr). The original data for both sources were expressed in instantaneous rate of gr/sec. These have been converted to ton/yr emissions for comparison against exemption provisions in the regulatory programs. A conversion factor of 34.775 was used which assumes constant daily operations of emission sources over a year.

4/ Source of emissions data is Odeco, Inc. Ocean Bounty exploratory vessel operating in Gulf of Alaska and lower Cook Inlet. (Phillips Petroleum, 1978).

5/ Source of emissions data is production platform Baker in upper Cook Inlet offshore reservoir near Kenai. (Dames and Moore, 1979.) Hydrocarbon emissions data were not available for platform Baker. Reactive hydrocarbon emissions estimated for a typical OCS production platform by U.S. EPA were substituted instead (U.S. EPA, 1977).

Sources: Phillips Petroleum, 1978; Dames and Moore, 1979; U.S. EPA, 1977.

Table IV.A.2.p.-2
Estimated Ambient Air Quality Concentrations in Lower Cook Inlet Attributable to a Typical OCS Exploratory Vessel and Production Platform [1/]

Emission Source and Averaging Period [2/]	CRITERIA POLLUTANT: CONCENTRATIONS (ug/m^3)				
	Carbon Monoxide	Hydrocarbons	Nitrous Oxides	Particulates	Sulfur Dioxides
Exploratory Vessel					
1-hour			2.0		0.19
3-hour	Exempt	Exempt	1.8	Exempt	0.17
24-hour			0.8		0.08
Production Platform					
1-hour			2.53		0.56
3-hour	Exempt	Exempt	2.28	Exempt	0.50
24-hour			1.01		0.22

[1/] Ambient concentrations for the criteria air pollutants have been estimated for a minimum distance between OCS tracts in the proposed lease sale area and the shorelines of lower Cook Inlet and Shelikof Strait; this distance is approximately 5 miles. Ambient concentrations have been simulated through usage of a Gaussian plume model following guidelines of U.S. EPA air quality models (EPA, 1977 and EPA, 1978). Specific parameter values include the following:

Parameter	Exploratory Vessel	Production Platform
Effective Stack height	13.7 meters (45 ft)	11.35 meters (37.22 ft)
Stack Diameter	0.32 meters (1 ft)	0.53 meters (1.73 ft)
Average Wind Speed	7.6 meters/second (17 mph)	7.6 meters/second (17 mph)
Radiation	moderate to slight	moderate to slight
Stability Class	C	C

Meteorological information was compiled in lower Cook Inlet by OCSEAP-sponsored research (Reynolds, 1979). The stack height and diameter information was obtained from permit application for the exploration vessel and production platform respectively (Phillips Petroleum, 1978; Dames and Moore,1979).

Estimated ambient concentrations from either the exploratory vessel or production platform do not include background concentrations; baseline ambient air monitoring data for much of coastal Alaska is unavailable (EPA, 1978). Ambient concentrations attributable to the sources are estimated at the center line of the plume and at ground surface.

[2/] The Gaussian model was calibrated to estimate 1 hour concentrations for the criteria pollutants emanating from the sources. Pollutant concentrations for 3-hour, 8-hour, and 24-hour averaging times were derived by conversion factors set forth in EPA air quality modelling guidelines (U.S. EPA, 1977).

Table IV.A.2.p.-3
Simulated Air Quality Impacts of Pacific-Alaska
LNG Facility at Nikiski

Pollutant and Averaging Period		Maximum Concentrations (ug/m^3)[1]			
		LNG Plant	Industrial Background	Natural Background[5]	Total[2]
Sulfur Dioxide	3-hour	80 (0.4,360)	558 (0.8,360)	20	578 (0.8,360)
	24-hour	37 (0.4,360)	223 (1.2,10)	20	248 (1.2,360)
	Annual	3 (0.4,360)	17 (0.6,360)	20	39 (0.6,360)
Total Suspended Particulates					
	24-hour	6 (0.6,30)	88 (0.4,30)	40	130 (0.4,30)
	Annual	0.4(0.6,30)	6 (0.6,360)	40	47 (0.6,360)
Carbon Monoxide	1-hour	197 (0.8,60)	NC[3]	1140	NC
	8-hour	60 (0.8,30)	NC	1140	NC
Nitrogen Dioxide[4]	Annual	11 (0.4,190)	11 (0.8,340)	20	38 (0.4,190)

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[1] Locations of maximum concentrations relative to northeast corner of the LNG site are given in parentheses. The first number is distance in kilometers. The second number is direction in degrees measured clockwise from true north.

[2] Not equal to total of the natural background plus the maximum from the LNG plant and the maximum from industrial background sources because those maximums did not necessarily occur in the same location or at the same time.

[3] NC = Not calculated.

[4] Total NO_x as NO_2.

[5] Source: USEPA, 1978.

Source: Dames and Moore, 1979.

Air quality impacts associated with the proposal, both offshore and onshore, should be evaluated in context of regulatory authorities and air quality standards: The applicable State and Federal air quality standards provide a basis for measuring air quality impacts, while the regulatory authorities provide mitigation measures for possibly significant air quality impacts.

Offshore emissions sources from OCS exploratory vessels and production platforms are subject of USGS regulations promulgated under the OCSLAA (43 USC 1334(a)(8); 30 CFR 250.2, 250.34-3, 250.57-1; 45 FR 15128). DOI's responsibility for regulating OCS emissions are discussed in section I.C. of this EIS.

Under the USGS program for regulating OCS air emissions, significant air quality impacts are defined in terms of a series of reviews:

> An initial determination is performed as to whether the OCS emission source generates a threshold level of emissions which warrants further investigation.
>
> If the OCS emissions source is greater than the exemption threshold identified in (a) above, then an air quality assessment of onshore receptors must be performed. If estimated ambient concentrations onshore exceed specified "significant levels," then air emission controls are imposed under terms of the USGS rules.

A review of the representative OCS emission sources in table IV.A.2.p.-1 indicates that total hydrocarbons (THC), CO, and TSP can be considered insignificant and subject to exemptions pursuant to USGS rules. However, NOX and SO_2 would be subject of air quality analysis to determine if air quality "significance levels" were exceeded. The SO_2 emissions from hypothetical OCS production platforms (platform Baker) are marginally above the USGS exemption (100 tons/year).

The representative OCS emissions sources for SO_2 and NOX show that the significance levels for these pollutants would not be exceeded for averaging periods other than possibly an annual average value. The air quality simulations performed in table IV.A.2.p.-2, do not include annual average values, hence, a comparison with USGS significance levels for this exposure interval is not possible. The possibility of significant air quality effects for SO_2 and NOX from the representative offshore emission sources would be subject to USGS determined BACT emission controls. This requirement should mitigate any marginally significant SO_2 and NOX emissions from OCS exploratory vessels and production platforms.

Onshore air quality impacts from LNG operations, including loading of LNG vessels, would be insignificant if the gas liquefaction and loading of LNG occurs at either the Pacific-Alaska or Phillips LNG plant at Nikiski. The New Source Review and Prevention of Significant Deterioration (PSD) application of Pacific-Alaska LNG associates demonstrated that neither the State of Alaska air quality standards, the Federal NAAQS, nor the Federal PSD Class II increment maxima would be violated (Dames and Moore, 1979). An inspection of the standards in table III.F.-1 versus the incremental air quality effects attributed to the Pacific-Alaska LNG facility in table IV.A.2.p.-3 yields this finding. The air quality impacts of the existing Phillips LNG facilities at Nikiski are incorporated under the table IV.A.2.p.-3 as part of the "Industrial Background" emission sources.

Onshore air quality impacts from a marine oil terminal, including vessel emissions during the loading period, are not available. If a commercial find of hydrocarbons is made from OCS sale 60, the lessee(s) would submit an OCS development and production plan in which air quality effects of proposed facilities will be identified. In the absence of an air quality assessment of marine terminal operations ensuing from OCS sale 60, the current air quality conditions surrounding the Drift River marine oil terminal on the west side of Cook Inlet can be referenced. The State Department of Environmental Conservation (DEC) does not consider the Kenai Peninsula Borough portion of the Cook Inlet AQCR to be in violation of any State air quality standards; in particular, the Alaska Department of Environmental Conservation does not consider the Drift River marine terminal facility to be a major air emissions source under its State air quality stationary source regulations (18 AAC 50.300).

The onshore air quality impacts from gas pipeline pumping stations are expected to be insignificant assuming the imposition of any EPA designated BACT as air quality mitigation measures.

There is a PSD Class I area located on the west side of Cook Inlet; the Tuxedni National Wildlife Refuge. The nearest OCS tract proposed in sale 60 is approximately 12 miles from the nearest land segment of this EPA designated Class I PSD area. The air quality assessment in table IV.A.2.p.-2 from representative OCS exploration and production emission sources shows that the PSD Class I area allowable increments in table III.F.-1 are not likely to be violated. The air quality simulations in table IV.A.2.p.-2 do not include SO_2 and TSP estimates for annual averaging periods. On a statistical basis, however, the annual average value for SO_2 and TSP ambient concentrations would be less than the simulated 24-hour value shown in table IV.A.2.p.-2.

The above findings are based upon sampled emissions data, simplified air quality simulations (with the exception of the LNG facility assessment), and incomplete meteorologic data. More rigorous modeling, together with better data sources or conservative assumptions, could yield higher or lower air quality simulations. Given these circumstances, some conservative assumptions have been made in estimating OCS air quality impacts. Definitive air quality assessments would be performed on individual facility/source applications, and on USGS required exploration plan submittals. The preamble to the USGS rules on air quality state that an EIS on a proposed lease sale is an inappropriate forum for a final assessment of the onshore air quality effects of OCS operations (45 FR 15136).

Conclusion: Air quality impacts from both offshore and onshore exploration and production operations would be insignifcant. No State and Federal air quality standards would be expected to be violated, and no EPA Prevention of Significant Deterioration allowable maxima for Class I and Class II areas would be expected to be exceeded. USGS BACT emission controls would be required for some major emission sources; these function as satisfactory mitigation measures to any potentially significant air quality impacts.

Cumulative Effects: Cumulative air quality effects from other major development actions, would likely be associated with marine vessel emissions and extractive minerals and coal industry operations. Other major developments would generate air quality impacts locally and would not contribute to regional air quality effects.

The only possible regional air quality effects would be photochemical oxidant and acid rain. There has been no documentation of the oxidant effect occurring significantly in southcentral Alaska. Oxidant forms occasionally in the Anchorage urban area in the summer months. However, the Anchorage area is in attainment status with a State ozone standard and the NAAQS oxidant standard. A PSD increment maximum for oxidant has not been established yet, and the State DEC has devised no control strategy for oxidant precursor emissions in the Cook Inlet southcentral AQCR.

At present, there has been no measurement of the acid rain effect occurring in southcentral Alaska. Some concern of possible acid rain effect upon national interest lands has been expressed, specifically in the Kenai National Moose Range on the Kenai Peninsula. The State DEC is proposing a monitoring study of the acid rain issue on the Kenai Peninsula to see if future developments warrant control strategies on SO_2 emissions.

Total suspended particulate (TSP) levels on the west coast of upper Cook Inlet are likely to be significant once major coalfield development occurs. However, stationary source OCS contribution to regional TSP levels will be insignificant in terms of cumulative effects. SO_2 and NOX emissions from increased tanker traffic in Cook Inlet will contribute to the emissions inventory for these two pollutants. It is difficult to anticipate the level of cumulative air quality effects for TSP, SO_2, and NOX because of the uncertainty of future development scenarios. There is the possibility, after 10-15 years of major development actions in the Cook Inlet, that TSP, SO_2, and NOX levels will approach the PSD Class II increment ceilings.

Unavoidable Adverse Effects: Post-lease activities would cause various types of air emissions. Most of these emissions would be minor and short-term, and would not impact the onshore areas.

In case of a gas leak or a gas well blowout, methane pollutants would volatize quickly and drift away; or if a fire resulted, pollutants would consist mainly of carbon dioxide and water vapor.

If any oilspill resulted in fire, large amounts of particulate carbon and oxides of carbon, together with unknown amounts of sulphur oxides, nitrogen oxides, evaporated crude oil liquids, and partially oxidized compounds, would enter the air. Local air quality would be degraded during the period of the fire by the addition of the particulate matter. Mitigating measures would not totally prevent the above occurrences. The unavoidable result would be a localized temporary decrease in air quality which would vary with the magnitude of the incident.

3. Alternative II - No Sale: With this alternative, there would be no additional Federal leasing at this time in lower Cook Inlet and Shelikof Strait. Federal leases already have been issued in lower Cook Inlet (sale CI, fig. II.B.1.a.-1), and oil from State leases in upper Cook Inlet passes through lower Cook Inlet. Refer to the FEIS for the proposed 5-year OCS lease schedule and the FEIS for OCS sale 55 (DOI, 1980) for a general discussion of potential impacts associated with the development of alternative energy sources.

a. Impacts on Vulnerable Coastal Habitats: Adverse impacts and unavoidable adverse effects could result from existing petroleum activities in Cook Inlet. Refer to the sale CI FEIS (USDI, 1977). Refer to section IV.A.2.a. for a discussion of the cumulative effects which could result from other projects (as described in sec. IV.A.1.h.).

b. Impacts on Commercial and Sportfish: Adverse impacts and unavoidable adverse effects could result from existing petroleum activities in Cook Inlet. Refer to the sale CI FEIS (USDI, 1977). Refer to section IV.A.2.b. for a discussion of the cumulative effects which could result from other projects (as described in sec. IV.A.1.h.).

c. Impacts on Commercial Fishing: Adverse impacts and unavoidable adverse effects could result from existing petroleum activities in Cook Inlet. Refer to the sale CI FEIS (USDI, 1977). It is estimated that the traditional commercial fisheries would not change greatly from what they are at present; catches would probably not increase much beyond what they are now. Prices paid for catches would likely increase, however. A major new bottomfishery may develop which would increase numbers of fishermen, numbers and size of boats, and, perhaps, numbers of processors. Refer to section III.H.2. (Future Without the Proposal - Economy) for further discussion of the no sale alternative as it relates to commercial fishing. Refer to section IV.A.2.c. for a discussion of the cumulative effects which could result from other projects (as described in sec. IV.A.1.h.).

d. Impacts on Marine and Coastal Birds: Adverse impacts and unavoidable adverse effects could result from existing petroleum activities in Cook Inlet. Refer to the sale CI FEIS (USDI, 1977). Refer to section IV.A.2.d. for a discussion of the cumulative effects which could result from other projects (as described in sec. IV.A.1.h.).

e. Impacts on Marine Mammals: Adverse impacts and unavoidable adverse effects could result from existing petroleum activities in Cook Inlet. Refer to the sale CI FEIS (USDI, 1977). Refer to section IV.A.2.e. for a discussion of the cumulative effects which could result from other projects (as described in sec. IV.A.1.h.).

f. Impacts on Endangered Species and Non-Endangered Cetaceans: Adverse impacts and unavoidable adverse effects could result from existing petroleum activities in Cook Inlet. Refer to the sale CI FEIS (USDI, 1977). Refer to section IV.A.2.f. for a discussion of the cumulative effects which could result from other projects (as described in sec. IV.A.1.h.).

g. Impacts on Terrestrial Mammals: Adverse impacts and unavoidable adverse effects could result from existing petroleum activities in Cook Inlet. Refer to the sale CI FEIS (USDI, 1977). Refer to section IV.A.2.g. for a discussion of the cumulative effects which could result from other projects (as described in sec. IV.A.1.h.).

h. Impacts on Social Factors:

(1) Impacts on Population: Adverse impacts and unavoidable adverse effects could result from existing petroleum activities in Cook Inlet. Refer to the sale CI FEIS (USDI, 1977). Cumulative impacts would be the same as base case population, shown in tables IV.A.2.h.(1)-1 and -3.

(2) Impacts on Sociocultural Systems: Adverse impacts and unavoidable adverse effects could result from existing petroleum activities in Cook Inlet. Refer to the sale CI FEIS (USDI, 1977). Refer to section IV.A.2.h.(2) for a discussion of the cumulative effects which could result from other projects (as described in sec. IV.A.1.h.).

(3) Impacts on Community Infrastructure: Adverse impacts and unavoidable adverse effects could result from existing petroleum activities in Cook Inlet. Refer to the sale CI FEIS (USDI, 1977). Refer to section IV.A.2.h.(3) for a discussion of the cumulative effects which could result from other projects (as described in sec. IV.A.1.h.).

(4) Impacts on Subsistence: There would be no adverse impacts from oilspill contamination of subsistence resources, population pressure on resources, habitat destruction and associated noise, and other disturbances associated with construction of oil facilities and pipelines and oil and gas exploration other than those associated with existing petroleum activities in Cook Inlet. There would be no unavoidable adverse effects as a result of this alternative. Refer to section IV.A.2.h.(4) for a discussion of the cumulative effects which could result from other projects (as described in sec. IV.A.1.h.).

i. Impacts on the State, Regional, and Local Economies: The economic situation under this no sale case is described in section III.H.3. Significant impacts, cumulative effects, and unavoidable adverse effects would occur only on the national economy as described in section II.B.2.

j. Impacts on Cultural Resources: This alternative would eliminate all significant adverse impacts on the terrestrial and offshore archeological and historic sites. The lack of impetus to survey and systematically collect cultural materials, due to the lack of a proposal, could result in less knowledge of historic and prehistoric cultures of the region. This is not viewed as a significant impact due primarily to the undesirable risks of salvage archeology. There would be no unavoidable adverse effects with this alternative. Refer to section IV.A.2.j. for a discussion of the cumulative effects which could result from other projects (as described in sec. IV.A.1.h.).

k. Impacts on Visual, Wilderness, and Recreation Resources: Adverse impacts and unavoidable adverse effects could result from existing petroleum activities in Cook Inlet. Refer to the sale CI FEIS (USDI, 1977). Refer to section IV.A.2.k. for more details with respect to cumulative effects.

l. Impacts on Land Status and Land Use: Under the alternative of no action, there would be no impacts or unavoidable adverse effects on land status and land use in the Shelikof Strait area. Adverse impacts and unavoidable adverse effects could result from existing petroleum activities in Cook Inlet. Refer to the sale CI FEIS (USDI, 1977). Refer to section IV.A.2.l. for a discussion of the cumulative effects which could result from other projects (as described in sec. IV.A.1.h.).

m. Impacts on Transportation Systems: Adverse impacts and unavoidable adverse effects could result from existing petroleum activities in

Cook Inlet. Refer to the sale CI FEIS (USDI, 1977). Refer to section IV.A.2.m. for a discussion of the cumulative effects which could result from other projects (as described in sec. IV.A.1.h.).

n. Impacts on the Alaska Coastal Management Program: With the no sale alternative, there would be no impacts or unavoidable adverse effects on the Alaska Coastal Management Program (ACMP) for the State of Alaska, or the district Coastal Management Programs (CMP) in progress for the Kenai Peninsula Borough and the Kodiak Island Borough. Refer to section IV.A.2.n. for a discussion of the cumulative effects which could result from other projects (as described in sec. IV.A.1.h.). Refer to the CI FEIS (USDI, 1977) for discussion of potential impacts from ongoing petroleum activities in Cook Inlet.

o. Impacts on Water Quality: With the alternative of no sale, there would be no impacts or unavoidable adverse effects on water quality in Shelikof Strait. Adverse impacts and unavoidable adverse effects could result from existing petroleum activities in Cook Inlet. Refer to the sale CI FEIS (USDI, 1977). Refer to section IV.A.2.o. for a discussion of the cumulative effects which could result from other projects (as described in sec. IV.A.1.h.).

p. Impacts on Air Quality: Adverse impacts and unavoidable adverse effects could result from existing petroleum activities in Cook Inlet. Refer to the sale CI FEIS (USDI, 1977). Refer to section IV.A.2.p. for a discussion of the cumulative effects which could result from other projects (as described in sec. IV.A.1.h.).

q. Impacts on Marine Santuaries: This alternative would retain the proposed sale area in its present form for consideration as a marine sanctuary (see sec. IV.A.d.q.).

4. Alternative III - Delay the Sale (153 blocks):

a. Impacts on Vulnerable Coastal Habitats: The delay the sale alternative allows more time for accumulation of site-specific environmental data for areas such as Shelikof Strait. The accumulation of specific data would influence primarily post-lease decisions (e.g., specific development plans such as platform placement, pipeline routing, and facility siting). The present amount of information has allowed adequate assessment of the impacts of exploration and possible major oilspills on coastal habitats in both lower Cook Inlet and Shelikof Strait. The impacts with this alternative would not be significantly different from those with the proposal (sec. IV.A.2.a.).

Conclusion: The impacts with this alternative would not be significantly different from those with the proposal (sec. IV.A.2.a.).

Cumulative Effects: The cumulative impacts with this alternative would be similar to those with the proposal (sec. IV.A.2.a.).

Unavoidable Adverse Effects: The unavoidable impacts would be similar to those described for the proposal (sec. IV.A.2.a.).

b. Impacts on Commercial and Sportfish: Delaying the sale could provide time to fill data gaps in the occurrence and distribution of commercial and sportfish species especially for Shelikof Strait. While habitats needs and the areas of fish species occurrence are generally known, determination of the importance of different habitat types and their relationship to fish population well-being could help in determining alternatives. This would be of more help in the Shelikof Strait area than lower Cook Inlet.

Although delaying the sale would likely result in the same potential impacts as the proposal, these impacts could be better understood and perhaps avoided if the sale were delayed to allow for studies to better determine the habitat needs of fin and shell fish. Oilspill contingency plans could then include more specific information regarding fish habitats and populations.

Conclusion: This alternative would likely result in the same impacts as described in section IV.A.2.b. (proposal). Delay of the sale would permit ongoing and future studies to fill data gaps in the occurrence and distribution of fish species in the Shelikof Strait area. Therefore, potential impacts could be better understood and oilspill contingency plans could include specific information on fish habitats and populations.

Cumulative Effects: Delay of sale would likely have the same cumulative effects as described in the proposal.

Unavoidable Adverse Effects: Delay of sale would likely result in the same unavoidable adverse effects as described in section IV.A.2.

c. Impacts on Commercial Fishing: The impacts, cumulative effects, and unavoidable adverse effects on commercial fishing would not significantly differ from those of the proposal. Impacts are delayed, not avoided. Refer to section IV.A.2.c.

Conclusion: The impacts of this alternative would be the same as those of the proposal (sec. IV.A.2.c.).

Cumulative Effects: The cumulative effects of this alternative would be the same as those of the proposed action (sec. IV.A.2.c.).

Unavoidable Adverse Effects: The unavoidable adverse effects of this alternative would be the same as those of the proposal (sec. IV.A.2.c.).

d. Impacts on Marine and Coastal Birds: Delaying the sale could provide time to fill data gaps in the occurrence, distribution, and relative importance of the Shelikof Strait area for marine and coastal birds. Coastal areas along the Alaska Peninsula side of Shelikof Strait have never been studied to determine the abundance and distribution of marine and coastal birds. Only sketchy air survey information exists. On the east side of Shelikof Strait, a census of marine bird colonies has never been performed on a portion of the coast on Afognak Island and Raspberry Island. Little information exists on bird distribution and utilization of the bays, coastline, and other nearshore habitat along Shelikof Strait. The oilspill trajectory analysis indicates that the coastline along either side of Shelikof Strait is at high risk to oilspills in the proposed sale area. The area on the western side of

Afognak and Raspberry Islands that has not been surveyed for bird colonies is one of two land segments that show the highest probability of being hit by an oilspill in the sale area.

Although delay of the sale should have the same potential adverse impacts as the proposal, these impacts could be better understood and perhaps mitigated if the sale were delayed. Delay could allow time for studies to determine the relative importance of Shelikof Strait to marine and coastal birds, and identify vulnerable bird populations and habitats. This more complete and detailed information could then be included in an oilspill contingency plan.

Conclusion: Delay of the sale would permit ongoing and future studies to fill data gaps in the occurrence and distribution of marine and coastal birds in the Shelikof Strait area. Thus, if potential impacts could be better understood and oilspill contingency plans could include more specific information on vulnerable bird habitats and populations, the effects of oilspills on these resources would be mitigated.

Cumulative Effects: Delaying the sale would allow time to identify sensitive populations and habitats in Shelikof Strait that would be exposed to the cumulative effects of hydrocarbon activities in lower Cook Inlet. Such information would be useful to mitigate cumulative effects of oilspills on these resources.

Unavoidable Adverse Effects: Delay of this sale has the potential to reduce unavoidable adverse effects on marine and coastal birds in Shelikof Strait by providing time to allow ongoing and future studies to determine the occurrence, distribution, and relative importance of high oilspill risk coastal habitat to marine and coastal birds. This information could then be incorporated into oilspill contingency plans so that the effects of an oilspill on marine and coastal birds could be more effectively mitigated.

e. Impacts on Marine Mammals: Effects associated with this alternative would be essentially the same, at least qualitatively, as those discussed under the proposal (alternative I). The magnitude of effects could vary depending on the population status of affected species at the time when such a delay would terminate or when undesirable perturbations would occur. Delay of sale could provide an opportunity for needed surveys of marine mammal habitats (especially identification of such habitats in western Shelikof Strait) and further study of effects of pollution and disturbance on marine mammals native to the proposed sale area.

Conclusion: Effects associated with this alternative would be essentially the same qualitatively as those discussed under this proposal. Additional time for needed studies would be provided.

Cumulative Effects: Cumulative effects may vary depending on the status of other projects and of the affected species at the termination of a delay, or when undesirable perturbations would occur.

Unavoidable Adverse Effects: Unavoidable adverse effects would be essentially the same qualitatively as described for the proposal, except that improved knowledge from additional studies may help to reduce such effects.

f. Impacts on Endangered Species and Non-Endangered Cetaceans: Effects associated with this alternative would be essentially the same, at least qualitatively, as those discussed for the proposal (sec. IV.a.2.f.). Magnitude of effects could vary depending on population status of affected species at the time such a delay would terminate, or when undesirable perturbations would occur. Delay of sale would provide additional time for the performance of systematic surveys of cetacean utilization of the proposed sale area, especially that of Shelikof Strait.

Conclusion: Effects associated with the alternative would be essentially the same qualitatively as those discussed under the proposal. Additional time for systematic surveys in Shelikof Strait would be provided.

Cumulative Effects: Magnitude of cumulative effects may vary depending on the status of other projects and of the affected species at the termination of a delay. Qualitatively they would be essentially the same as under the proposal.

Unavoidable Adverse Effects: Unavoidable adverse effects would be essentially the same qualitatively as described for the proposal. Improved knowledge from additional surveys may help to reduce such effects.

g. Impacts on Terrestrial Mammals: With this alternative, potential impacts would be the same as those previously described under the proposal (sec. IV.A.2.g.). This alternative would only postpone potential impact on terrestrial mammals to some future time.

Conclusion: With this alternative, the same impacts as described for the proposal would likely occur, but would be postponed.

Cumulative Effects: The additive effect of the proposal and other activities in the proposed lease area, would be the same with this alternative.

Unavoidable Adverse Effects: The unavoidable adverse effects on terrestrial mammals with this alternative would be the same as those described for the proposal, but would occur at some time in the future.

h. Impacts on Social Factors:

(1) Impacts on Population: This alternative would provide 2 additional years of lead time for preparation for an eventual sale and its associated population increases. On the other hand, the uncertainty surrounding a delay could inhibit successful attempts at obtaining financing for expansion of community infrastructure in the event of a major oil discovery. Given these uncertainties and the recent planning work already completed by Kodiak Island Borough, the community of Port Lions, the Kenai Peninsula Borough, and the community of Homer.

Conclusion: Population impacts would be delayed approximately 2 years.

Cumulative Effects: This alternative would only delay by 2 years the onset of population increases associated with this sale. Base case projections, which assume cumulative population, would not be changed (see tables IV.A.2.h.(1)-1 and -3).

Unavoidable Adverse Effects: There would be no unavoidable adverse effects for Kodiak and Port Lions. Homer and Kenai-Soldotna effects would be the same as for the proposal. See section IV.A.2.h.(1).

(2) Impacts on Sociocultural Systems: Delaying the sale would merely delay for 2 years the onset of impacts likely to occur, as discussed in section IV.A.h.(1), alternative I. See sections IV.A.3.h.(1) and IV.A.3.h.(4) for further discussion of potential impacts of this alternative on population and subsistence.

Conclusion: This alternative would result in impacts on the sociocultural systems of lower Cook Inlet and Shelikof Strait communities similar to those described in section IV.A.2.h.(1).

Cumulative Effects: Cumulative effects would be essentially the same as for the proposal, only delayed 2 years. See section IV.A.2.h.(2).

Unavoidable Adverse Effects: Unavoidable adverse effects would be the same as for the proposal, only delayed 2 years. See section IV.A.2.h.(2).

(3) Impacts on Community Infrastructure: Delaying the proposed sale 2 years would merely delay the impacts cited in section IV.A.2.h.(2) (proposal) 2 years. In the case of Port Lions, a 2-year delay would provide additional time to plan and prepare for the community infrastructure impacts described in section IV.A.2.h.(3). This presumably might lessen some impact on readiness to meet increased police needs, etc.

Conclusion: A 2-year delay of the proposed sale would provide Port Lions an additional 2 years to plan and prepare for potential community infrastructure impacts associated with the proposed lease sale. There would be no impacts to the Kenai, Homer, and Kodiak areas with this alternative.

Cumulative Effects: Cumulative impacts would remain as described in section IV.A.2.h.(3).

Unavoidable Adverse Effects: Unavoidable adverse impacts remain as described in section IV.A.2.h.(3).

(4) Impacts on Subsistence: The impacts which occur with this alternative would be essentially the same as those described for the proposal (sec. IV.A.2.h.(4)).

Cumulative Effects: The cumulative effects of a 2-year delay in the proposed sale would be the same as those discussed under the proposal (sec. IV.A.2.h.(4)).

Unavoidable Adverse Effects: This alternative could postpone the unavoidable adverse effect of a statistically likely major oilspill event in Shelikof Strait and its likely disruption of subsistence activities and village economies. See the discussion for section IV.A.2.h.(4) (proposal) for the implications of these effects.

i. Impacts on the State, Regional, and Local Economies: Delaying the sale 2 years would merely delay the impacts cited in the proposal 2 years. From a local economic point of view there is no obvious advantage to delaying the sale 2 years.

Conclusion: See proposal, section IV.A.2.i.

Cumulative Effects: See proposal, section IV.A.2.i.

Unavoidable Adverse Effects: See proposal, section IV.A.2.i.

j. Impacts on Cultural Resources: A delay in the proposed lease sale would postpone impacts on terrestrial archeological and historic sites (identified in section IV.A.2.j.).

Conclusion: See proposal (sec. IV.A.2.j.).

Cumulative Effects: See proposal (sec. IV.A.2.j.).

Unavoidable Adverse Effects: See proposal (sec. IV.A.2.j.).

k. Impacts on Visual, Wilderness, and Recreation Resources: Impacts would be the same as those described in section IV.A.2.k. (proposal).

Conclusion: Refer to section IV.A.2.k. (proposal).

Cumulative Effects: Impacts of visual, wilderness, and recreation resources would be the same as those described for the proposal (sec. IV.A.2.k.).

Unavoidable Adverse Effects: Refer to the proposal (sec. IV.A.2.k.).

l. Impacts on Land Status and Land Use:

Conclusion: With this alternative, impacts on land status and land use would be the same as as those described for the proposal (sec. IV.A.2.l).

Cumulative Effects: Same as above.

Unavoidable Adverse Effects: Same as above.

m. Impacts on Transportation Systems: Impacts on the transportation system of Port Lions would be the same with this alternative as with the proposal (sec. IV.A.2.m.). Impacts on the transportation systems of Anchorage and the Kenai Peninsula could actually be reduced due to probable improvements of their transport systems.

Conclusion: This alternative would not change many impacts on Port Lions but might reduce effects felt by other areas affected by the sale.

Cumulative Effects: Unknown, as a delay of sale would place it in a time frame for which we have little knowledge in regard to proposed projects.

Unavoidable Adverse Effects: Same as section IV.A.2.m.

n. Impacts on the Alaska Coastal Management Program:

Federal Coastal Zone Management Act: The Federal Coastal Zone Management Act of 1972, as amended, contains significant provisions affecting the development of OCS oil and gas resources. Section 307 of the CZMA provides that Federal agencies conducting or supporting activities directly affecting the coastal zone will do so consistent to the maximum extent practical with approved State coastal management programs. This section applies to Federal agency activities, Federal licenses and permits, OCS plans, and to projects funded by Federal agencies, and is discussed in Section I.C.

Alaska Coastal Management Program: The Alaska Coastal Management Program and the progress of local program development by the Kenai Peninsula and Kodiak Island Boroughs are outlined in Section III.D.

A prerequisite of approval of the ACMP by the Department of Commerce is that the national interest has been recognized in Alaska's coastal zone by considering uses and facilities that are of national significance (16 U.S.C. 1456(c)(8); 15 CFR 923.52). The ACMP requires that land and water uses of state concern cannot be unreasonably or arbitrarily restricted or excluded from the coastal zone by District CZM programs (AS 46.40.060). Included in this definition are resources and facilities that contribute to meeting national energy needs, including OCS exploration development activities and facilities.

Federal actions including OCS pre-lease activities, which would "directly affect" the coastal zone, have to be consistent to the maximum extent practicable with the approved ACMP. The Federal consistency regulations (15 CFR Part 930) also require that exploration, development, and production activities associated with offshore energy production which require a Federal license or permit be consistent if they affect any land use or water use in the coastal zone. Since the ACMP is broad, comprehensive, and process-oriented with land use specifics not identified, and since the specific effects on the coastal zone of subsequent lease activities are undetermined, the exact relationship or degree of impact or potential conflicts between the two processes cannot be determined at this time.

Kenai Peninsula Borough Coastal Management Program: The Kenai Peninsula Borough Coastal Management Program is described in Section III.D.3. The borough is presently involved in developing a district program and should have a plan completed by the fall of 1982. The borough expects to have its plan authorized by the State legislature in January 1982. This would occur after the proposed sale date of September 1981.

The KPB has considerable experience with oil and gas development as a result of several years of drilling on State waters in upper Cook Inlet and of lower Cook Inlet lease sale CI. As a result of sale CI, the KPB did a study of the implications of OCS development for the borough. It is assumed that the same types of onshore sites and development activities will occur as a result of sale 60. Much of the infrastructure is already in place and a considerable amount of the KPB economy depends on oil and gas and supporting activities.

Kodiak Island Borough Coastal Management Program: The Kodiak Island Borough (KIB) Coastal Management Program is described in section III.D.4. The borough is just beginning the development of its program. The KIB program will include that portion of the Kodiak Archipelago facing Shelikof Strait.

The KIB has sponsored studies pertinent to coastal management. However, these studies have focused on the east side of the Archipelago in response to proposed OCS sale 46 in the western Gulf of Alaska (Kramer, Chin, and Mayo, 1978). A 1978 study for the borough stated, as an OCS development goal, that development of OCS-related facilities would be discouraged in or around the population centers on Kodiak Island, and that if OCS facilities are located on the island that they be remote, self-sustained, and in limited number.

The KIB CZM program will include studies done in the past for the borough, plus some updating to include the new scenarios for sales 60 and 61. The program will probably not be legislatively authorized before the proposed sale 60 sale date.

Options for Decision: The ACMP, and the Kenai Peninsula and Kodiak Island Boroughs' Coastal Management Programs represent a planning process and proposed coastal land and water use plans, respectively, that designate uses and activities that are considered proper and improper for various identified portions of the lower Cook Inlet/Shelikof Strait areas. The Alaska Coastal Management Program (ACMP) has been approved by the Department of Commerce (DOC). The borough programs are currently being developed and remain to be adopted by the State and be officially recognized under the Federal CZMA.

A prerequisite of approval of the ACMP by the DOC is that the national interest be adequately considered in the development of the program. In Alaska's coastal zone, uses and facilities that are of national significance are considered in the definition of "uses of State concern." Uses of State concern cannot be unreasonably or arbitrarily restricted or excluded. Included in this definition are resources and facilities that contributre to meeting national energy needs.

The Federal Coastal Zone Management Act and implementing regulations provide that all Federal lease and permit activities described in detail in OCS plans and which affect any land use or water use in the coastal zone must be conducted in a manner consistent with approved CZM programs. Post-lease activities can be expected to affect Alaska's coastal zone, and may be influenced by the two boroughs' district programs.

When the borough programs (which may designate certain uses and activities) are approved, they would become part of the ACMP and complement the basic ACMP regulations, procedures, and philosophies. The State cannot approve a district program which is not in basic conformance with the State program policies in that program. One of the criteria for approval is that the district program should not unreasonably or arbitrarily restrict or exclude uses of State concern, which include the use of resources and the siting of facilities for energy production in the coastal zone.

Since the specifics of the boroughs' program are not yet determined, it is not possible to project the specific degree of impact or conflict between such program and the activities which might result from this proposal. Post-leasing activities that require Federal licenses or permits will have to be consistent if they affect any land use or water use in Alaska's coastal zone.

At the present time, the Secretary of Interior has the following options regarding the proposed coastal management program of the Kodiak Island and Kenai Peninsula Boroughs:

> Reschedule the sale after the boroughs' CMPs have been approved and formally incorporated into the ACMP.
>
> Cancel the sale: The orderly and efficient development of the area and efficient use of existing infrastructure would be restrained. Adoption of this option would also result in the same losses described in earlier sections with regard to cancelling the sale.
>
> Proceed with the sale as planned. The mitigating measures and restrictions placed on post-sale operation should adequately protect the environment and should not adversely affect either the planning process or implementation of the boroughs' CMPs.

There undoubtedly will be more impact on developing the lower Cook Inlet oil and gas resources from the ACMP than vice versa, depending on the interpretation of how consistency will apply. This is because the ACMP is a comprehensive coastal land and water use program that provides for consideration of and decisionmaking about, among other things, energy production and development. The ACMP recognizes that mineral extraction has to occur where the resource is found, but it will influence the exploration, development and production activities, and facilities which might result from this proposal.

> Proceed with the sale but delete tracts on which lessee activities might conflict with provisions of the ACMP.

In summary, there could be substantial impact on development of lower Cook Inlet oil and gas resources from the CMPs of the Kodiak Island and Kenai Peninsula Boroughs, because these plans could influence the exploration, development and production activities, and facilities. However, any onshore facilities which support exploration resulting from this proposal would likely be sited within the existing infrastructure. Given the long lead time involved, it can be assumed that the boroughs' plans would be in effect long before the activities, facilities, and locations it would influence were identified, let alone developed. Delaying the lease sale until approval of the CMPs would provide little marginal benefit since the award of leases poses no immediate direct impact, and most post-lease activities are far enough in the future to come under the boroughs' CMPs.

o. Impacts on Water Quality:

Conclusion: Under this alternative, the impacts on water quality would be substantially the same as with the proposal (sec. IV.A.2.o.).

Cumulative Effects: Same as above.

Unavoidable Adverse Effects: Same as above.

p. Impacts on Air Quality: Under this alternative, impacts on air quality would be the same as with the proposal (sec. IV.A.2.p.).

Conclusion: Impacts on air quality would be similar to those described for the proposal (sec. IV.A.2.p.).

Cumulative Effects: Future development actions would add to projected emissions inventory in the Cook Inlet area, and thus add to potentially cumulative air quality effects (see sec. IV.A.2.p.).

Unavoidable Adverse Effects: The unavoidable adverse effects which would occur as a result of this alternative would be the same as outlined for the proposal (sec. IV.A.2.p.).

q. Impacts on Marine Sanctuaries:

Proposals and Present Status: A 2-year delay of the proposed action would provide an opportunity for formal nomination of portions of the sale area for a marine sanctuary. Formal nomination for marine sanctuaries of various sizes, including one for all of lower Cook Inlet, have been submitted to the National Oceanic and Atmospheric Administration (NOAA). The other specific areas recommended are Kachemak Bay, Tuxedni Bay, the Barren Islands, and the Gulf coast of the Alaska Peninsula, including Kodiak Islands (fig. IV.A.4.q.-1). All of these areas are part of, or close to, the proposed lower Cook Inlet/Shelikof Strait lease sale area. In response to these nominations, NOAA included them on its List of Recommended Areas (LRA) published in the Federal Register October 31, 1979. The nominations came in reponse to lease sales scheduled in Cook Inlet and the western Gulf of Alaska, but it is not known if the nominations were intended to preclude oil and gas leasing.

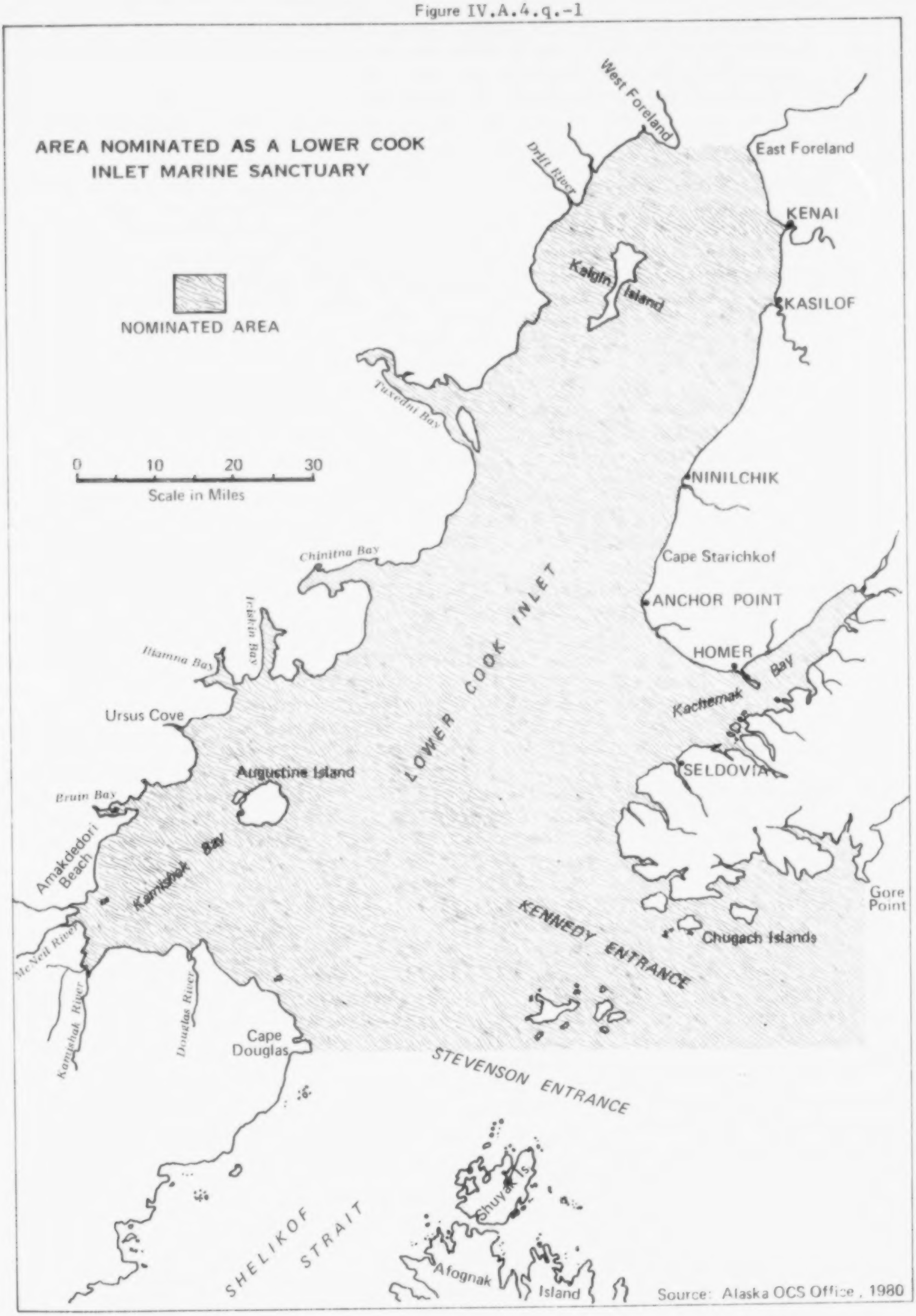
NOAA has not developed a schedule for the consideration of any of these sanctuary proposals, and it is unlikely that a formal public workshop will be conducted before publication of this document. In commenting on this proposed sale, NOAA recommended that the lease sale and any subsequent exploratory and development activities be conducted in a manner that ensures maximum protection of living marine resources and habitats. NOAA did no further work on any Alaskan sanctuary proposals during 1980.

The purposes of these nominations were for habitat preservation, species preservation, and research. All these areas contain large and important seabird colonies, and are extensively used by marine mammals. They are also characterized by rich finfish and shellfish fisheries which are tremendously important to both recreational and commercial fishermen. Kelp and eelgrass are found in these areas extensively. Descriptions of and impacts to the natural resources of the area are found in sections III.B. and IV.A.2., respectively.

There are now 70 areas on NOAA's List of Recommended Areas, including lower Cook Inlet, but only seven areas are on the List of Active Candidates. Lower Cook Inlet is not one of these active candidates. In March 1980, a management plan for the Key Largo Coral Reef Marine Sanctuary in the Gulf of Mexico was established after 5 years in development. Presently, this is the only marine sanctuary established to protect a living resource. In addition, in Volume 44 of the Federal Register, October 31, 1979, NOAA announced the removal of all of the Georges Bank area, including the OCS oil and gas lease sale 42 area from the List of Active Candidates, because safeguards had been jointly developed with Interior to address environmental risks to the Georges Bank.

The OCSLAA imposes on the Secretary of the Interior the duty to balance the benefits of expedited development of oil and gas resources with the other

Figure IV.A.4.q.-1


AREA NOMINATED AS A LOWER COOK INLET MARINE SANCTUARY
NOMINATED AREA
0 10 20 30
Scale in Miles
West Foreland
Drift River
East Foreland
KENAI
Kalgin Island
KASILOF
Tuxedni Bay
NINILCHIK
Chinitna Bay
Cape Starichkof
ANCHOR POINT
Iniskin Bay
Iliamna Bay
HOMER
Kachemak Bay
Ursus Cove
LOWER COOK INLET
SELDOVIA
Augustine Island
Bruin Bay
Amakdedori Beach
Kamishak Bay
Gore Point
KENNEDY ENTRANCE
Chugach Islands
McNeil River
Kamishak River
Douglas River
Cape Douglas
STEVENSON ENTRANCE
Shuyak Is.
SHELIKOF STRAIT
Afognak Island

Source: Alaska OCS Office, 1980

goals of the Act, including the need to protect the human, coastal, and marine environment. In many cases, the OCSLAA, as well as other legislation, provides equity considerations when interference occurs with resources which are the subject of other Federal programs. At the present time, the Secretary of Interior retains a number of options for decision regarding the marine sanctuary proposal. They are:

> Delay the sale until a decision has been made regarding the marine sanctuary issues. Adoption of this option would retain some of the area in an oil-development free state for future marine sanctuary consideration, but would not entirely remove the risk of potential impacts from oil and gas activities, since oil and gas related development of OCS sale CI in areas offshore the 3-mile limit will continue during the delay period. Orderly and efficient development of oil and/or gas structures found near the Federal/State boundaries may require future sales in Federal waters. This could make the delay decision untenable.
>
> Cancel the sale. Adoption of this option would have the same results as described above. In addition, the orderly and efficient development of the area and efficient use of the existing infrastructure would be restrained.
>
> Proceed with the sale as planned, pending a decision regarding the marine sanctuary proposal.

Under the OCSLAA, the Secretary of Interior must balance the benefits of oil and gas development with the other goals of the act.

More specifically, the Secretary must address the probability and magnitude of the potential impacts associated with oil and gas development and, to the extent practical, reduce such impacts through mitigating measures. The OCSLAA mirrors this in its goal of balancing the benefits of expedited oil and gas development with protection of the marine, human, and coastal environment. Through the Secretary's mandate of balancing orderly resource development with environmental protection, as well as compliance with the Endangered Species Act and the Marine Mammal Protection Act and consistency provisions of the Coastal Zone Management Act, the exploration, development, and production of oil and gas should not preclude the possible future decision of creating a marine sanctuary in lower Cook Inlet. The marine sanctuary value of resources will not be unnecessarily jeopardized, because mitigating measures are adequate to protect them.

It is not presently known what configuration or regulatory controls would pertain to a DOC-proposed marine sanctuary. The actual areas involved could be significantly different from those suggested above. The policy, objective, and goals of such a sanctuary are also largely unknown because they have not been formulated.

Mitigating measures developed specifically for this lease area are expected to provide additional protection to the resources of the sale area. The OCSLAA requires compliance with all other applicable laws such as the Marine Mammal Protection Act and the Endangered Species Act. It is not expected, therefore, that Marine Sanctuary restrictions would need to be more strict.

The result of this option is that adequate protection will be given to the area through the many authorities of the Secretary of Interior and that the orderly and efficient development of the area may also be pursued without significant harm to the natural resources of the area and the environment.

In the short term, because of the adequacy of controls in place or proposed for this action, little if anything should happen to affect Marine Sanctuary management options. In the long-term, oil and gas development under this proposed lease sale should not constrain future decisions concerning the creation of a sanctuary adjacent to or in the sale area.

5. Alternative IV (68 blocks): Modify the proposal by deletion of 66 blocks in Shelikof Strait and 19 blocks in Cook Inlet. The following sections assess the impacts of oil and gas leasing for alternative IV (see fig. II.B.4.a.-1).

a. Impacts on Vulnerable Coastal Habitats: Impacts on coastal habitats (sec. IV.A.2.a.) would be altered by deletion of tracts in Shelikof Strait. The most likely number of major oilspills equals only one, as opposed to four for the proposal (table 1, appendix D). The most likely number oilspills from other sources (existing leases in lower Cook Inlet and the existing tanker routes from upper Cook Inlet) equals seven, so the overall risks of major oilspills are reduced only about 25 percent by deletion of Shelikof Strait (from 11 with the proposal to 8 with this alternative).

The coastal area of greatest risk from oilspills is changed greatly by alternative IV; Shelikof Strait would be impacted less frequently. For example, the probability of impact on the razor clam beaches near Swikshak in northwestern Shelikof Strait is reduced about 85 percent by alternative IV. The clams on these beaches are worth up to $100,000 per year, and are vulnerable to oilspills. As discussed in section IV.A.2.a., clams on beaches which are impacted by an oilspill would probably be killed or tainted for a period of one year.

Similarly, the probability of oilspill impacts on the western Kodiak Island bays, such as Kupreanof Strait, is reduced about 85 percent by alternative IV. Kupreanof Strait and the adjacent bays are important for reproduction of very valuable herring and salmon populations, as explained in section III.B.2.

The probability of oilspills impacting the coastal habitat in lower Cook Inlet remains essentially the same in spite of the deletion of any blocks in Shelikof Strait.

Aside from oilspills, the potential impacts of alternative IV on the coastal habitats would not be severe (sec. IV.A.2.a.).

Conclusion: Alternative IV reduces by about 25 percent the probability of oilspill occurence. The probability of an oilspill impacting vulnerable coastal habitats in Shelikof Strait is reduced by about 85 percent with this alternative.

Cumulative Effects: A large number of potential oilspills are associated with existing State and Federal leases and tanker routes in Cook Inlet. Because of these existing risks, deletion of Shelikof Strait blocks from the proposed sale would reduce the projected cumulative impacts on the Shelikof Strait coastal habitats. The cumulative impacts on lower Cook Inlet coastal habitats would remain unchanged from those associated with the proposal (sec. IV.A.2.a.).

Unavoidable Adverse Effects: The oilspills that may impact the vulnerable coastal habitat are not easily avoidable. They would be due to unpredictable accidents, and could not be entirely cleaned up before impacting some coastal habitats. Potential mitigating measure number 2 (sec. II.B.1.b.) could help reduce the possibility of an oilspill occurring and reduce the potential for damage to the surrounding coastal habitats. Further, the Offshore Oil Pollution Compensation Fund has been established to pay for the costs of OCS oilspill impacts (see appendix F).

b. Impacts on Commercial and Sportfish: Deletion of the Shelikof Strait blocks from the proposal would significantly reduce the risks of potential oil pollution impacts on pink salmon; king, tanner, and Dungeness crab; and bottomfish species in Shelikof Strait. However, oilspill risk to lower Cook Inlet fish habitats would remain about the same as with the proposal. Oilspill probability risks to fish habitats along both sides of Shelikof Strait would be reduced. In land segment 45, Kukak Bay-Kinak Bay (an important shrimp area) oilspill probability risk decreases from 31 percent (the proposal) to 8 percent with this alternative (appendix D, tables 14-15, no. 45). However, oilspill risk to coastal spawning habitats in lower Cook Inlet remain about the same.

Changes in the transportation scenario (eliminating a pipeline through Kupreanof Strait, a tanker terminal near Whale Pass, and tankering out of Marmot Bay), would greatly reduce oilspill risks to the Whale Pass area, near the important habitats mentioned above.

Conclusion: Deletion of the Shelikof Strait blocks could significantly reduce the potential impacts of oil pollution on some local fin and shellfish populations in the Shelikof Strait. However, impacts to fish populations in the lower Cook Inlet region would be essentially the same as in the proposal.

Cumulative Effects: The risk of potential cumulative oilspill effects of this alternative and of existing oil and gas activities in Cook Inlet on fin and shellfish populations in the Shelikof Strait area would be greatly reduced by this alternative.

Unavoidable Adverse Effects: The unavoidable adverse effects would be similar to those described for Cook Inlet in section IV.A.2.b. (proposal). However, unavoidable adverse impacts would be significantly reduced for the Shelikof Strait.

c. Impacts on Commercial Fishing: Deletion of the Shelikof Strait blocks and those at the extreme north end of the proposed sale area would reduce impacts (discussed in section III.A.2.c.) primarily in the Shelikof Strait area. This alternative would reduce the conflicts for dock space, materials, and labor in the western Kodiak area. It would reduce the chance of a pollutant event fouling fishing gear and commercial fish species. It would also reduce the threat of fish population loss (sec. III.A.2.b.). Based on the oilspill trajectory model, the area having the greatest chance of being affected by a pollutant event (Uganik and Malina Bays) would be almost totally protected.

Conclusion: This alternative would reduce potential impacts on commercial fishing in the sale area.

Cumulative Effects: Cumulative impacts in the Shelikof Strait area would be reduced by this alternative. There may be some residual ocean space use conflicts because many of the fishermen range between Shelikof Strait and Cook Inlet, but immediate impacts on commercial fishing in Shelikof Strait would be reduced. Cumulative impacts in the Cook Inlet area would be the same as discussed in section IV.A.2.c.

Unavoidable Adverse Effects: There may be some ocean space conflicts between fishing vessels and support and supply vessels in Shelikof Strait. In Cook Inlet, these impacts would be the same as the proposal (sec. IV.A.2.c.).

d. Impacts on Marine and Coastal Birds: Deletion of the Shelikof Strait blocks from the proposal would reduce significantly the risks of potential oil pollution impacts on marine birds in offshore foraging areas and coastal habitats in Shelikof Strait, Whale Pass, Kupreanof Strait, and Marmot Bay. Oilspill probability contact for seabird foraging areas within 3 daybs (appendix D, table 8-9) decrease from 49 percent with the proposal to 5 percent during the spring-summer, and from 57 percent to 13 percent during the fall-winter. However, oilspill risks to lower Cook Inlet foraging areas remain about the same as the proposal. Oilspill probability risks to coastal habitats along both sides of Shelikof Strait are drastically reduced. For example the Raspberry Island-Kupreanof Strait area oilspill probability contact decreases from 23 percent (the proposal) to 3 percent with this alternative (appendix D, table 14-15, no. 15). Land segment 45, Kukak Bay-Kinak Bay oilspill probability risk decreases from 31 percent to 8 percent (the proposal) with this alternative (appendix D, table 14-15, no. 45). However, oilspill risk to coastal habitats in lower Cook Inlet and the Barren Islands remain about the same.

Changes in the transportation scenario (eliminating a pipeline through Kupreanof Strait, a tanker terminal near Whale Pass, and tankering out of Marmot Bay) would greatly reduce oilspill risks to the Whale Pass area, one of the most important marine bird concentration areas in the Kodiak and lower Cook Inlet region. The oilspill trajectory analysis does not include the oilspill probability risks to inner Marmot Bay and Whale Pass.

Conclusion: Deletion of the Shelikof Strait blocks could significantly reduce the risk of potential impacts of oil pollution on marine bird populations in the Kodiak and Shelikof Strait areas. However, bird populations in the lower Cook Inlet region and the Barren Islands will be subject to the same potential impacts as in the proposal. This alternative would be less likely to have major impacts on birds than the proposal.

Cumulative Effects: The combined potential oilspill effects of this alternative and of existing petroleum activities in Cook Inlet on marine bird populations in the Shelikof Strait-Kodiak area could be significantly reduced as indicated by comparing the oilspill trajectory analysis results (appendix D, tables 8-16) between this alternative and the proposal. For example, the cumulative oilspill probability on southern seabird foraging areas are reduced from 66 percent to 34 percent during the spring-summer period (appendix D, tables 8 and 4). However, cumulative oilspill probability risks for foraging areas in the lower Cook Inlet and Barren Islands are about the same as the proposal (high oilspill risk from existing tankering 63-68% and existing lease activities 76-77%, appendix D, tables 14 and 21). The cumulative effects along the Shelikof Strait could be significantly reduced by this proposal. For example, Raspberry Island-Kupreanof Strait (land segment 15) cumulative oilspill probability of contact is reduced from 30 percent to 12 percent when comparing the proposal with this alternative (for the 10 day spill trajectory). However, lower Cook Inlet coastal areas such as Kamishak Bay and the Barren Islands cumulative oilspill probabilities are about the same between this alternative and the proposal; these areas are at high risk from existing hydrocarbon activities (see appendix D, tables 14 and 15, nos. 53, 54, and 56).

In conclusion, the risk of cumulative impacts from oil pollution on marine birds could be greatly reduced for the Shelikof-Kodiak area by this alternative. However, lower Cook Inlet and the Barren Islands bird populations and habitats would fare the same risk from oil impacts and other development projects as with the proposal.

Unavoidable Adverse Effects: Deletion of the Shelikof Strait blocks would significantly reduce the unavoidable impacts of hydrocarbon development described in the proposal on bird populations within the Shelikof Strait area. However, bird populations on the Barren Islands and Cook Inlet would probably be exposed to the same unavoidable impacts described in the proposal.

e. Impacts on Marine Mammals: Refer to section IV.A.2.e. for a discussion of the qualitative nature of direct and indirect effects on marine mammals that may be associated with the proposal or its alternatives. Appendix D, table 9, shows that with this alternative the Barren Islands (area C, including Sugarloaf Island) would be subjected to slightly less oilspill risk than would be expected under the proposal (10% chance, alternative IV versus 11% chance, alternative I), of spill contact over the life of the field. (Note: Unless otherwise specified, oilspill risk analyses made in this section refer to probabilities conditional on the development of a production field and to spill contact rates within 10 days of simulated launch.) As for the proposal, the Ushagat Island vicinity (with three sea lion hauling areas, graphic 11), is under a 6 percent chance of spill contact (appendix D, table 15, no. 81), Sugarloaf Island shorelines are under a 2 percent chance of spill contact (appendix D, table 15, no. 82), and Marmot Island faces practically no risk (appendix D, table 15, no. 22). Thus, for the major sea lion concentration areas, Alternative IV does little to afford additional protection from the direct effects of spills as compared to the proposal. However, considerable protection of sea lion hauling areas receiving intermittent use at Cape Gull and a consistently used area at Takli Island Rock, on the western side of Shelikof Strait would be achieved. Under alternative IV, Cape Gull would be subjected to an 8 percent chance of oilspill contact (appendix D, table 15, no. 45) as compared to 31 percent under the proposal. Takli Island Rock, which is used by 700-1,000 sea lions, would face a 2 percent chance of spill contact (appendix D, table 15, no. 44) as compared to 8 percent with the proposal. Probability of spills hitting the Puale Bay area would be reduced from 5 percent (alternative I) to 1 percent (appendix D, table 15, no. 41).

Alternative IV would provide substantial reduction of risk of oilspill contact to harbor seal habitats of the northern and northwestern Kodiak Archipelago.

The Malina Bay hauling area would face a 3 percent chance of contact (appendix D, table 15, no. 15) with this alternative as compared to a 23 percent chance with the proposal. The northern Afognak and western Shuyak Island hauling areas (graphic 11) would be subjected to only a 6 percent chance of contact (appendix D, table 15, no. 17) as compared to a 15 percent chance under the proposal.

Overall, nearshore marine environments of the northern and northwestern Kodiak Archipelago would also be exposed to less risks. (Appendix D, table 9, shows area D having a 17% chance of contact under Alternative IV as compared to 48% under alternative I.) Such reduction could be important to long-term harbor seal productivity in the area. The Tugidak Island harbor seal hauling and pupping concentration area would remain under low risk of oilspills with this alternative. Probability of spill contact with St. Augustine Island, a harbor seal pupping area, would only be reduced 2 percent (from 9% with alternative I, see appendix D, table 15, no. 56), and the nearshore areas of Kamishak Bay in the immediate vicinity of Augustine Island would remain under high (29%) risk (appendix D, table 9, area H).

This alternative would probably reduce risk to fur seals in Shelikof Strait. However, no substantial reduction of risk to the bulk of the fur seal population migrating east of Kodiak would be afforded as compared to the probable low risks already described for the proposal.

Alternative IV would substantially reduce risks of oilspill contact to sea otter habitats of the northern and northwestern Kodiak Archipelago and western Shelikof Strait areas (appendix D, table 9, areas D and E). As discussed for harbor seals, considerable reduction of risks would occur in the former regions (17% with alternative IV versus 48% percent with alternative I; appendix D, tables 9 and 8, respectively, area D). Other areas adjacent to lower Cook Inlet, such as the southwestern Kenai Peninsula, Anchor Point, and Kamishak Bay (appendix D, table 9, areas A, G, H), only show slight reduction of risk of oilspill contact as a result of this alternative. In Kamishak Bay, sea otters and their habitat would face the same high oilspill risk and with this alternative as with the proposal (appendix D, table 9, area D).

Thus, when compared to the proposal, alternative IV would reduce localized indirect effects on marine mammals inhabiting Shelikof Strait, especially sea otters which rely on sedentary benthic food sources. Since sea lions, harbor seals, and fur seals rely primarily on food sources which are not sedentary, it is not possible to accurately predict how selection of alternative IV may or may not indirectly affect such species. Nevertheless, since the areas showing the greatest reduction of oilspill risk are noted for the greater abundance of sea otters (e.g., Afognak-Shuyak Island habitats), this alternative (or alternative V, see section VI.A.6.e.) could be considered of major importance in terms of minimizing risks to sea otter populations of the sale 60 area. Less oilspill-induced mortality and/or higher carrying capacity (over the long-term) of the latter sea otter habitats would be expected under this alternative than would be expected under the proposal.

Effects of noise and disturbance may be felt by sea lion or harbor seal populations in particular (sec. IV.A.2.e.). Alternative IV would probably reduce the potential for disturbance of harbor seal and sea lion hauling areas of the Shelikof Strait region. However, potential for disturbance of sea lions in the Barren Islands would probably remain at levels which may exist for the proposal. Since alternative IV would not involve the construction of a pipeline to, and tanker terminal on, eastern Kodiak Island, localized effects of disturbance would probably be reduced in Kupreanof Strait and eastern Kodiak Island (such as near Talnik Point) as compared to the proposal. Nevertheless, it is possible, if not likely, that noise disturbance associated with exploration, development, and production phases will directly impact sea lions and/or harbor seals in the sale area as described for the proposal, although perhaps to a reduced level in the Shelikof Strait region.

Conclusion: It can be concluded that alternative IV would afford substantial reduction of risk of oilspills and related effects to major sea otter and certain harbor seal habitats, particularly those in the northern Kodiak Archipelago and Shelikof Strait as compared to the proposal. Protection of sea lion hauling and feeding areas in Shelikof Strait would also be enhanced. Oilspill-related effects in lower Cook Inlet would remain at relatively the same level as under the proposal, although reduced somewhat in terms of spill contact probabilities. An uncertain, but probably minimal reduction of risk to fur seals would be accrued. Reduced localized impacts of spills on eastern Kodiak Island marine habitats would be expected since no tanker facilities would be constructed in the vicinity.

Cumulative Effects: Appendix D, table 9, shows that the cumulative probability (alternative IV plus existing lease area) oilspill contact with marine mammal habitats of the eastern Kenai Peninsula, the Barren Islands, and the north-northwestern Kodiak Archipelago would be high (areas B, C, and D, respectively). Cumulative contact on the north-northwestern Kodiak Archipelago would be reduced by this alternative from 68 percent (alternative I) to 48 percent chance (alternative IV). Cumulative oil contact probabilities of marine mammal habitats in the vicinity of Anchor Point, the southwestern Kenai Peninsula, Kamishak Bay, and western Shelikof Strait would be moderate to high (appendix D, table 9, areas G, A, H, and E, respectively). Cumulative oilspill contact with Sugarloaf Island would be the same for this alternative as for the proposal (11% chance, appendix D, table 15, No. 2). Anchor Point, Kachemak Bay, and Kamishak Bay would not experience substantial reduction of cumulative oilspill risk as a result of this alternative. Direct effects of cumulative spills on sea otters in lower Cook Inlet would be likely, and oilspill-induced indirect effects through reduced habitat quality and/or population productivity would also be likely. Land segments in the vicinity of Cape Ugat and Cape Uganik would have less probability of cumulative spills (14% with alternative IV versus 23%, alternative I) than under the proposal (appendix D, table 15, no. 13). In western Shelikof Strait, substantial reduction of cumulative oilspill contact would result for Cape Gull (24% chance with alternative IV vs. 32% with alternative I), and limited reduction of risk for Takli Island Rock. Risk would also reduce slightly for Puale Bay. Areas mentioned here are known habitat of sea otters (eastern Kenai Peninsula, Barren Islands, northern Kodiak Archipelago, Anchor Point, southwestern Kenai Peninsula, Kamishak Bay, and western Shelikof Strait), sea lions (eastern Kenai Peninsula, Barren Islands, northern Kodiak Archipelago, Cape Ugat and Cape Uganik, Cape Gull, Takli Island Rock, and Puale Bay), and harbor seals (northern Kodiak Archipelago, Kamishak Bay, and Shelikof Strait coastal areas). The magnitude of direct or indirect effects on marine mammals could be less than that sustained under the proposal since the cumulative probabilities for alternative IV were generally less in certain important habitats (e.g., north and northwestern Kodiak Archipelago) than those computed for the proposal.

Of concern for this alternative, as well as the proposal, is the high probability of cumulative spills in the Barren Island area. Alternative IV reduced this probability by only 1 percent compared to the proposal (see appendix D, tables 8 and 9, area C), and for Sugarloaf Island, no reduction of risk would be afforded by this alternative (appendix D, table 15, no. 82). Insensitivity of cumulative spill probability in the area to changes in the proposal may be related to the moderate level of risk (18%) associated with existing tankering (appendix D, table 32, area C). Sea lions occupying Sugarloaf Island and surrounding waters may eventually show a response to chronic or cumulative spill occurrence under alternative IV, and the degree of this response would be on the same order as that sustained under alternative I (the proposal). The Portlock Bank feeding areas of sea lions and fur seals would be subjected to less oilspill risk associated with tanker traffic under this alternative. Indirect effects of repeated spills may also be sustained by harbor seals, but probably to a lesser extent in Shelikof Strait than would occur under the proposal. Therefore, this alternative would probably contribute less to cumulative effects of oilspills than would the proposal.

The extent of cumulative, disturbance-related mortality or behavioral change due to alternative IV on marine mammals is unknown. This alternative would reduce the potential for disturbance of sea lions and harbor seals in Shelikof Strait, as well as on eastern Kodiak Island, as compared to the proposal. Elimination of a tanker loading facility on eastern Kodiak Island and reduction of activity in Shelikof Strait would probably reduce potential for such effects on sea lions and harbor seals. The contribution of alternative IV to nonspill-related cumulative effects on marine mammal populations (e.g., loss of habitat to facility sites) in the proposed sale area is unknown.

Unavoidable Adverse Effects: If the field goes into production, it is likely that sea otters will sustain some mortality as a direct result of spills associated with this alternative, although less than would be incurred by the proposal. It is likely that localized habitat deterioration and/or food source loss resulting from oilspills would occur at least temporarily, especially for sea otters or harbor seals in lower Cook Inlet. It is possible, if not likely, that unavoidable disturbance of sea lion or harbor seal concentrations would occur as a result of long-term changes in the transportation systems, localized impacts of facility construction, or localized aircraft, boat, or other industrial noise and activity. The Information to Lessee on Birds and Mammals (sec. II.B.1.b.), which recommends that the lessee operate aircraft and vessels no closer than 1 mile from observed wildlife or known wildlife concentration areas, would help to minimize behavioral disturbance of a short-term, localized nature, especially at hauling areas and breeding rookeries.

f. Impacts on Endangered Species and Non-Endangered Cetaceans: See section IV.A.2.f. for a general discussion of petroleum-related impacts on endangered species and non-endangered cetaceans. The oilspill risk analysis for alternative IV shows substantial reduction in probability of spill contact and potential spill effects for northern and northwest Kodiak Archipelago nearshore areas (appendix D, table 9) as compared to the proposal. Thus, a moderate (17%) chance of spills affecting areas used by endangered and non-endangered cetaceans in this locale would be sustained, compared to higher (48% chance) associated with the proposal. As for the proposal, nearshore areas on the eastern side of Kodiak Island would be subjected to little spill risk. This alternative provides little additional protection to the Barren Island area or the latter area as compared to the proposal, and therefore provides little additional protection to areas of high seasonal use by gray whales. The extent of movement of spills from lower Cook Inlet into the open water of the Gulf of Alaska and Portlock Bank areas would be about the same as estimated for the proposal.

Of importance is the apparent reduction of spill contact probability for nearshore environments of eastern Shelikof Strait (and other areas in Shelikof Strait) which would be afforded by this alternative. Land segments from Viekoda Bay to Uyak Bay (appendix D, table 15; nos. 12, 13, 14) show a substantial reduction on oilspill risk (1-4% chance) as a result of this alternative compared to higher (6-14%) risks for the proposal. Thus, for at least one area used by endangered species (fin and gray whales) oilspill vulnerability would be reduced. Habitats and local populations of other cetaceans which may occur in the strait would also be at less oilspill risk.

Alternative IV would do little to reduce oilspill risk to beluga whales (or their habitats) which may winter in Kamishak Bay. This alternative shows a 29 percent chance of spill contact with area H (appendix D, table 9), as compared to 33 percent chance for the proposal. Oilspill risk to nearshore environments north of Kamishak Bay and Kachemak Bay is low for this alternative (as well as for the proposal).

Elimination of the need for a tanker terminal in the Talnik Point vicinity with this alternative would also reduce probable localized impacts of spills, disturbance, or cetacean habitat changes which may occur under the proposal.

No negative effects would be expected to be sustained by Aleutian Canada geese as a result of this alternative.

Conclusion: It is possible that endangered and non-endangered cetaceans may sustain direct and indirect effects due to oilspill occurrence in areas of moderate to high risk of contact such as the northern Kodiak Archipelago and Kamishak Bay. However, effects on whales would possibly be less than those of the proposal. This alternative would pose less oilspill risk or disturbance on cetaceans which may occur along the eastern side of Kodiak Island and Shelikof Strait than the proposal. It is possible that cetaceans may sustain negative effects as a result of disturbance, but probably to a lesser extent than would be incurred under the proposal. There is no evidence at this time to suggest any significant impacts of this alternative on endangered birds.

Cumulative Effects: Cumulative oilspill risks as a result of alternative IV plus the existing leases are relatively high for the northern and northwest Kodiak Archipelago, Barren Islands, and eastern Kenai Peninsula (appendix D, table 9, areas B (25%), C (38%), and D (48%)), and of medium risk for land segments in eastern Shelikof Strait (appendix D, table 15, nos. 12, 13, 14). Of the former areas, area D would receive the most protection from these cumulative direct oilspill impacts since the cumulative probability of spills is 20 percent less than would be incurred under the proposal. Cumulative spill probabilities for lower Cook Inlet (e.g. Kamishak Bay) are virtually unchanged (as compared to the proposal) as a result of this alternative, remaining very high (76% chance) in the Augustine Island-Cape Douglas vicinity (Appendix D, table 9, area H). Alternative IV would do little to reduce uncertain cumulative oilspill effects in terms of oilspill-related mortality or reduction of food sources in areas which may be important to endangered cetaceans. Alternative IV may reduce cumulative disturbance and/or indirect effects, particularly for species frequenting the eastern nearshore areas of Kodiak Island. Relatively little can be said about alternative IV in an absolute sense except that certain localized reduction of cumulative effects may occur, particularly in Shelikof Strait, Kupreanof Strait, and the Talnik Point-Marmot Bay area.

Cumulative effects on Aleutian Canada geese would not be expected to be significant as a result of this alternative.

Unavoidable Adverse Effects: Although similar qualitatively to those of the proposal, the degree of unavoidable impacts on endangered and non-endangered whales as a result of this alternative is unknown. The Information to Lessee on Birds and Mammals (sec. 11.B.1.b.), which recommends that the lessee operate aircraft and vessels no closer than 1 mile from observed wildlife or known wildlife concentration areas, would help to minimize behavioral disturbance of a short-term, localized nature. No unavoidable adverse impacts are expected to be sustained by Aleutian Canada geese as a result of this alternative.

g. Impacts on Terrestrial Mammals: Deletion of Shelikof Strait blocks would reduce the risk of oil pollution impacts on terrestrial mammals and their coastal habitats along the Kodiak Archipelago and the Alaska Peninsula side of Shelikof Strait. The oilspill analysis (sec. IV.A.1.d.) indicates significant reduction of spill risk for the southwest Afognak-Raspberry Islands coastal habitat which contains brown bear intensive stream use areas (see graphic 9 and fig. IV.A.1.d.-7, land segment 15). The probability of an oilspill contacting Afognak-Raspberry Islands is reduced from 23 percent with the proposal to 3 percent with this alternative (appendix D, tables 14 and 15, No. 15). The probability of an oilspill contacting brown bear high spring-use and stream-use areas in Kukak Bay is reduced from 31 percent to 8 percent with this alternative (appendix D, tables 14 and 15, no. 45). However, brown bear spring-use areas and other terrestrial mammal coastal habitats in Kamishak Bay would face the same risk to oilspills as the proposal.

This alternative would eliminate the need for an onshore pipeline and tanker terminal facility at Talnik Point. Thus, there would be no onshore habitat disturbance in the Kodiak area with this alternative. However, terrestrial mammals and their habitat on the Kenai Peninsula between Anchor Point and Nikiski would still be affected.

Conclusion: Deletion of the Shelikof Strait blocks could reduce potential oil pollution impacts on terrestrial mammals and their habitats along Shelikof Strait and eliminate onshore habitat disturbance in the Talnik Point-Whale Passage area. However, effect on terrestrial mammals and their coastal habitats in the lower Cook Inlet area would be the same as the proposal (sec. IV.A.2.g.). The overall impacts on terrestrial mammals would likely be minor.

Cumulative Effects: This alternative could effectively reduce cumulative effects on terrestrial mammals in the Shelikof Strait area. In the lower Cook Inlet area, terrestrial mammals would be subject to the same degree of cumulative impacts as the proposal (sec. IV.A.2.g.).

Unavoidable Adverse Effects: Deletion of the Shelikof Strait blocks would eliminate most unavoidable disturbances of terrestrial mammal habitat and populations on Kodiak Island, but not in the lower Cook Inlet area where terrestrial mammals would be exposed to the same unavoidable impacts as with the proposal (sec. IV.A.2.g.).

h. Impacts on Social Factors:

(1) Impacts on Population: Deletion of the Shelikof Strait blocks would eliminate population impacts on Port Lions and Kodiak by eliminating the need for an oil terminal in the Kodiak-Port Lions area. Impacts in the Kenai-Soldotna and Homer areas would be the same as those described in section IV.A.2.h.(1) (see table IV.A.2.h.(1)-4).

Conclusion: Major population impacts on the Port Lions and Kodiak areas would be eliminated with this alternative. Homer and Kenai-Soldotna population impacts remain the same as for the proposal. See section IV.A.2.h.(1).

Cumulative Effects: Cumulative population increases with respect to this alternative would be most serious in Homer and would be the same as those outlined for the proposal (sec. IV.A.2.h.(1)). The cumulative effects for Port Lions and Kodiak would be reduced substantially with elimination of Shelikof Strait blocks and associated construction of terminal facilities in the Port Lions area.

Unavoidable Adverse Effects: These would be the same for Homer and Kenai-Soldotna as for the proposal. See section IV.A.2.h.(1). This alternative substantially reduces the unavoidable adverse effects on Port Lions and Kodiak resources and environment.

(2) Impacts on Sociocultural Systems: Sociocultural impacts on the communities of Kodiak and Port Lions would be minimized under this alternative. Easily absorbed impacts on Kenai and Soldotna would be insignificant. Homer would experience equivalent impacts as described for alternative I (sec. IV.A.2.h.(2)).

Conclusion: This alternative would significantly reduce potential major impacts on the sociocultural systems of Kodiak and Port Lions by reducing oilspill risk and potential disruption from construction of facilities in the Kodiak-Port Lions area and pipelines in the Talnik Point-Port Lions area.

Cumulative Effects: Cumulative sociocultural impacts on Kodiak and Port Lions would be reduced significantly. Homer and Kenai-Soldotna impacts would be the same as in the proposal.

Unavoidable Adverse Effects: By deleting blocks in Shelikof Strait, unavoidable adverse effects of potential oilspills, including heightened social conflict in Kodiak and Port Lions and temporary disruption to smaller subsistence villages along Shelikof Strait, would be minimized.

(3) Impacts on Community Infrastructure: The deletion of some lower Cook Inlet and all Shelikof Strait blocks confine potential impacts to the Kenai Peninsula area. Growth in this area is described in section III.H.2. Impacts on community infrastructure in the Kenai and Homer areas resulting from this alternative would be as described in section IV.A.2.h.(3).

Conclusion: Impacts resulting from this alternative would be limited to the Kenai and Homer areas and are described in section IV.A.2.h.(3).

Cumulative Effects: Cumulative impacts resulting from this alternative would be limited to the Kenai and Homer areas and are described in section IV.A.2.h.(3). There would be no cumulative impacts on the Kodiak and Port Lions areas.

Unavoidable Adverse Effects: See section IV.A.2.h.(3) for the Kenai and Homer areas only.

(4) Impacts on Subsistence: Deletion of Shelikof Strait blocks would substantially reduce the oilspill risk to all the primary subsistence-oriented villages along Shelikof Strait. Alternative IV would also reduce the risk to subsistence use areas near English Bay and Port Graham in Cook Inlet.

Conclusion: A major oilspill event could seriously disrupt the local economies of villages and cause hardship to residents dependent upon locally available resources. The extent of disruption and hardship would vary with the size of the spill and other factors. See the discussion under the proposal (sec. IV.A.2.h.(4)). This alternative reduces the high oilspill risks to Shelikof Strait villages and the resources on which they depend.

Cumulative Effects: The additional risk of continued exploration on sale CI leases added to the risk of oilspills from alternative IV is depicted in figure IV.A.1.d.-12. Three land segments in Kamishak Bay and one near Anchor Point, as well as land segment 81 on the Barren Islands, show high risk of oilspill contact when current CI lease exploration risks are added to the risks of this alternative. No additional risk to primary subsistence use areas occurs under this cumulative case.

Unavoidable Adverse Effects: With deletion of the Shelikof Strait blocks, the unavoidable adverse effects of oilspills on subsistence use areas in Shelikof Strait and Cook Inlet would be substantially moderated. See the discussion under the proposal (sec.IV.A.2.h.(4)).

i. Impacts on the State, Regional, and Local Economies: This alternative eliminates most impacts in the Kodiak, Port Lions areas. Impacts on the Kenai and Homer areas remain much as in the proposal (sec. IV.A.2.),

Conclusion: Economic impacts would be insignificant in the Kodiak and Port Lions areas with this alternative. Mild impacts would be likely in the Kenai area, while moderate impacts would be likely in the Homer area (see sec. IV.A.2.i.).

Cumulative Effects: Cumulative impacts on Kodiak from future projects could, with a very low likelihood, invite local short-run boom economic conditions. Cumulative impacts in the Kenai-Cook Inlet Census Division would, as noted in the proposal (sec. IV.A.2.1.), likely be mild. Petroleum development infrastructure in the Kenai area is well prepared for additional petroleum discoveries; hence, any induced changes would likely be mild.

Unavoidable Adverse Effects: There would be no unavoidable adverse impacts.

j. Impacts on Cultural Resources: This alternative would result in reduced impacts due to oilspills especially in the shore area near the deleted blocks at Anchor Point, Kamishak Bay, Karluk, and the Barren Islands.

Conclusion: There would be some reduction in potential impacts as a result of this alternative.

Cumulative Effects: There would be a reduction in potential impacts due to the proposed lease sale and other projects, as identified in section IV.A.1.h.

Unavoidable Adverse Effects: The potential unavoidable adverse effects which would occur as a result of this alternative would be reduced from those of the proposal.

k. Impacts on Visual, Wilderness, and Recreation Resources: Because blocks in Shelikof Strait are deleted, impacts on visual, wilderness, and recreation resources along the strait, on Kodiak Island near Port Lions, and near Kodiak City would likely be insignificant. The probability of an oilspill reaching the beaches hear Swikshak, a recreational clamming area, would be reduced by about 85 percent with this alternative (compared to the proposal). Impacts on the Kenai Peninsula and Cook Inlet would be the same as those described in section IV.A.2.k. (proposal).

Conclusion: Same as above.

Cumulative Effects: Cumulative effects would be the same as for the proposal (sec. IV.A.2.k.).

Unavoidable Adverse Effects: Except for the Shelikof Strait area, where no impacts would occur, unavoidable adverse effects would be the same as for the proposal (sec. IV.A.2.k.).

l. Impacts on Land Status and Land Use:

Conclusion: With alternative IV, impacts on land status and land use on the Kenai Peninsula would be much the same as with the proposal (sec. IV.A.2.l.). However, no land status or land use impacts on the Kodiak Archipelago would be likely because the Shelikof Strait portion of the proposed lease sale would be deleted.

Cumulative Effects: Same as above.

Unavoidable Adverse Effects: Same as above.

m. Impacts on Transportation Systems: Since this alternative would not involve oil facilities at Talnik Point, there would be no petroleum-related impacts to the transportation systems of Port Lions or Kodiak Island. Alternative IV would confine impacts to Anchorage and the Kenai Peninsula. Impacts on the transportation systems of these two areas would be similar to, but slightly reduced, from that of the proposal (sec. IV.A.2.m.). Fewer construction materials and personnel would be needed with this alternative. Total volume of traffic resulting from this alternative would be approximately one-third less than that which would be caused by the proposal.

Conclusion: Alternative IV would reduce transportation impacts on Anchorage and the Kenai Peninsula. There would be no impacts on the transportation systems of Port Lions and Kodiak Island.

Cumulative Effects: With the exception of Port Lions, cumulative effects would be similar to those outlined in section IV.A.2.m. (proposal).

Unavoidable Adverse Effects: The unavoidable adverse impacts which would occur as a result of alternative IV would be: 1) localized traffic congestion on the Sterling Highway; and 2) an increase of tanker traffic in the Cook Inlet and Gulf of Alaska.

n. Impacts on the Alaska Coastal Management Program:

Conclusion: With this alternative, the impacts on the State Coastal Zone Management Program as well as the Kenai Peninsula Borough District Coastal Management Program would likely be the same as with the proposal (sec. IV.A.2.n.). Alternative IV would not affect the Kodiak Island Borough because most of the Shelikof Strait blocks would be deleted. Coastal development would not, therefore, occur in Kodiak Island Borough. Refer to the discussion of the petroleum development scenarios described in section II.B.1.a. (proposal) and section II.B.4. (alternative IV).

Cumulative Effects: Same as above.

Unavoidable Adverse Effects: Same as above.

o. Impacts on Water Quality:

Conclusion: With this alternative, the impacts on water quality would be substantially the same as with the proposal (sec. IV.A.2.o.). Most water quality effects would be limited to the Cook Inlet area.

Cumulative Effects: Same as above.

Unavoidable Adverse Effects: Same as above.

p. Impacts on Air Quality: With this alternative, impacts on air quality would be substantially the same as with the proposal (sec. IV.A.2.p.).

Conclusion: Impacts which would occur as a result of this alternative would be the same as those described for the proposal (sec. IV.A.2.p.).

Cumulative Effects: The cumulative effects which would occur as a result of this alternative would be the same as those described for the proposal (sec. IV.A.2.p.).

Unavoidable Adverse Effects: The unavoidable adverse effects which would occur as a result of this alternative would be the same as those described for the proposal (sec. IV.A.2.p.).

6. Alternative V (53 blocks): Modify the proposal by deletion of 81 blocks in Shelikof Strait and 19 blocks in Cook Inlet. The following sections assess the impacts of oil and gas leasing for alternative V (see fig. II.B.5.a.-1.).

a. Impacts on Vulnerable Coastal Habitats: The chance of oilspills and oilspill risks to coastal habitats are essentially the same as those for alternative IV (sec. IV.A.5.a.).

Conclusion: The impacts on the coastal habitats of alternative V are the same as for alternative IV (sec. IV.A.5.a.).

Cumulative Effects: The cumulative impacts on coastal habitats of alternative V are the same as for alternative IV.

Unavoidable Adverse Effects: The unavoidable impacts, and the benefits of mitigating measures for alternative V are the same as for alternative IV.

b. Impacts on Commercial and Sportfish: Deletion of additional blocks off Cape Douglas and west of Stevenson Entrance could reduce slightly the risk of potential oilspill contact on fin and shellfish species in the Shelikof Strait and lower Cook Inlet areas.

An area of high risk of oilspill contact (Kukak Bay-Kinak Bay area) identified in section IV.A.2.b. (proposal) has a slightly reduced chance (8% versus 5%) of being contacted by an oilspill with this alternative (appendix D, tables 15 and 16, no. 45).

Conclusion: This alternative slightly reduces potential impacts to the Shelikof Strait and Cook Inlet commercial and sport fish populations.

Cumulative Effects: Potential oilspill risks from this proposed lease sale combined with existing hydrocarbon activity would be reduced very slightly with this alternative compared to alternative IV.

Unavoidable Adverse Effects: This alternative should have about the same unavoidable impacts as the proposal (sec. IV.A.2.b.).

c. Impacts on Commercial Fishing:

Conclusion: The impacts, based on this alternative would remain essentially the same as described for alternative IV. It may slightly, but not significantly, reduce the chance of oil reaching the eastern side of Afognak Island.

Cumulative Effects: Same as above.

Unavoidable Adverse Effects: Same as above.

d. Impacts on Marine and Coastal Birds: This alternative could result in a slight reduction of oilspill risk to marine and coastal birds in the Shelikof Strait compared to alternative IV. (sec. IV.A.5.d.) and a significant reduction of impacts on marine and coastal birds of Shelikof Strait compared to the proposal (appendix D, tables 14, 16, 8, and 10). Risk of spill contact with the Barren Islands and lower Cook Inlet bird populations would be about the same as those described for the proposal and for alternative IV.

An area of high risk of oilspill contact (Kukak Bay-Kinak Bay area) in the proposal analysis has a slightly reduced chance (8% versus 5%) of being contacted by an oilspill with this alternative (appendix D, tables 15 and 16, no. 45).

Conclusion: This alternative results in about the same oilspill risks as alternative IV. Potential impacts to the Shelikof Strait bird populations and habitats should be reduced only slightly in comparison to alternative IV. Potential impacts on the Barren Islands and lower Cook Inlet bird populations would be about the same as those impacts described in the proposal. This alternative would be less likely to have major impacts on birds than the proposal.

Cumulative Effects: This alternative would have about the same cumulative effects as alternative IV.

Unavoidable Adverse Effects: This alternative would have about the same unavoidable impacts as alternative IV.

e. Impacts on Marine Mammals: Comparison of tables 9 and 10 or of tables 15 and 16, appendix D, shows that alternative V generally would result in a reduced probability of oilspills below that of the proposal. In comparison to alternative IV, this alternative would result in a 6-percent reduction of oilspill risk (from 17% to 11%) to the north-northwestern Kodiak Archipelago.

It is likely that sea otters would sustain mortality and/or food source deterioration as a result of this alternative, particularly in the Kamishak Bay-Augustine Island area (Table 10, Area H, 26% chance). It is possible that noise and disturbance could affect marine mammals as a result of this alternative, especially sea lion or harbor seal populations located or concentrated on the Barren Islands or along the coast of lower Cook Inlet.

Conclusion: Alternative V would afford substantial reduction of risk of oilspills and related effects to major sea otter and certain harbor seal habitats, particularly those in the northern Kodiak Archipelago and Shelikof Strait as compared to the proposal. Greater protection of sea lion hauling and feeding areas in Shelikof Strait would be achieved. An uncertain, but probably minimal reduction of risk to fur seals would result. Oilspill-related effects on marine mammals in lower Cook Inlet would be relatively the same as those described for the proposal (sec. IV.A.2.e.), although reduced somewhat in terms of spill contact probabilities. Reduced localized impacts of spills and disturbance on eastern Kodiak Island marine mammal habitats would be expected since no tanker facilities would be constructed in the vicinity. This alternative would reduce the potential for disturbance of sea lions and harbor seals of Shelikof Strait, as well as on eastern Kodiak Island, as compared to the proposal.

Cumulative Effects: Cumulative spill probabilities in the northern Kodiak Archipelago, eastern Kenai peninsula, Barren Islands, Anchor Point vicinity, and Kamishak Bay remain high under alternative V.

Kamishak Bay-Augustine Island sea otter and harbor seal populations would be subjected to a 75 percent probability of spill contact as a result of this alternative (appendix D, table 10, area H). Reduction of cumulative oilspill probabilities would be achieved, primarily in Shelikof Strait and the northern Kodiak Archipelago. Refer to the "Cumulative Effects" evaluation for alternative IV, which is essentially applicable to alternative V.

Unavoidable Adverse Effects: Refer to the "Unavoidable Adverse Effects" evaluation for alternative IV (sec. IV.A.5.e.), which is essentially applicable to alternative V.

f. Impacts on Endangered Species and Non-Endangered Cetaceans: See section IV.A.2.f. for a general discussion of impacts. Alternative V would reduce risks of oilspills to certain areas as compared to the proposal and would result in additional reduction of oilspill contact probability over that afforded by alternative IV to the northwest and northern Kodiak Archipelago, Barren Islands, and eastern Kenai Peninsula (appendix D, table 10, areas B, C, D). This alternative would provide substantial reduction of oilspill risk to the northwest and northern Kodiak Archipelago nearshore environments, and to cetacean habitats in those areas as compared to the proposal (11% chance versus 48%). (NOTE: Unless otherwise specified, oilspill risk analyses made in this section refer to probabilities conditional on the development of a production field and to spill contact rates within 10 days of simulated launch.) As with alternative IV, this alternative would reduce risks to certain areas used by cetaceans on the eastern side of Shelikof Strait (appendix D, tables 16, nos. 12, 13, 14), but not significantly more than would alternative IV. As with alternative IV, this alternative would do little to reduce risk to a possible beluga wintering area in lower Cook Inlet (i.e., Kamishak Bay), but would reduce localized effects in the Talnik Point-Marmot Bay area. Therefore, it is possible that endangered and non-endangered cetaceans would sustain direct and indirect effects, particularly in areas of highest risk of contact. Since risks are somewhat lower than those described for the proposal, the impacts would occur less frequently. No negative effects would likely be sustained by Aleutian Canada geese as a result of this alternative.

Conclusion: It is possible that endangered and non-endangered cetaceans would sustain direct and indirect effects due to oilspill occurrence in areas of moderate risk of contact such as the northern Kodiak Archipelago. Cumulative probabilities of spills would be high in those areas. However, effects of oilspills on whales may be less than those of the proposal. This alternative poses less risk of localized effects of oilspills or disturbance than the proposal on the eastern side of Kodiak Island and in Shelikof Strait. It is possible that cetaceans may sustain negative effects as a result of disturbance, but probably to a lesser extent than would be incurred under the proposal. There is no evidence at this time to suggest significant impacts of this alternative on endangered birds.

Cumulative Effects: Cumulative oilspill risk as a result of alternative V (conditional on realization of production phases) plus the existing sale is relatively high for the northern and northwest Kodiak Archipelago, Barren Islands, and eastern Kenai Peninsula (appendix D, table 10, areas B, C, D), and of medium risks for land segments in eastern Shelikof Strait (appendix D, table 16, nos. 12, 13, 14). Thus, alternative V would do little to reduce cumulative oilspill effects in these areas which may be of importance to endangered cetaceans. Alternative V may reduce cumulative disturbance and/or indirect effects (sec. IV.A.2.f.), particularly for species frequenting the eastern side of Kodiak Island. Localized reduction (as compared to the proposal) of cumulative oil pollution or disturbance could occur, particularly in Shelikof Strait, Kupreanof Strait, and the Talnik Point-Marmot Bay area. Cumulative effects of oilspills or disturbance on the Aleutian Canada geese would not likely occur as a result of this alternative.

Unavoidable Adverse Effects: Although similar qualitatively to those of the proposal, the degree of unavoidable effects on endangered and non-endangered whales as a result of this alternative is unknown. The Information to Lessee on Birds and Mammals (sec. II.B.1.b.), which recommends that the lessee operate aircraft and vessels no closer than 1 mile from observed wildlife or known wildlife concentration areas would help to minimize behavioral disturbance of a short-term localized nature. No unavoidable adverse impacts are expected to be sustained by Aleutian Canada geese as a result of this alternative.

g. Impacts on Terrestrial Mammals: This alternative would allow the same degree of protection or reduction of potential impacts on terrestrial mammals and their coastal habitats as alternative IV (sec. IV.A.5.g.). Oilspill trajectory analyses for this alternative are very similar to alternative IV (sec. IV.A.1.d. and appendix D, tables 15 and 16). Oilspill probabilities for coastal habitats in Shelikof Strait are significantly reduced from those for the proposal (appendix D, tables 14 and 16). The probabilities of an oilspill contacting Kamishak Bay and other coastal areas in lower Cook Inlet are the same or nearly the same as those for the proposal (appendix D, tables 14 and 16, nos. 53 and 54).

Conclusion: This alternative would have essentially the same impacts on terrestrial mammals as alternative IV (sec. IV.A.5.g.); therefore, this alternative would reduce potential impacts as described for the proposal (sec. IV.A.2.g.). The overall impacts on terrestrial mammals would be minor.

Cumulative Effects: This alternative would have about the same cumulative impacts as alternative IV. Cumulative effects on terrestrial mammals in Shelikof Strait would be reduced, but the terrestrial mammals of the lower Cook Inlet area would be subject to the same degree of cumulative impacts as the proposal.

Unavoidable Adverse Effects: This alternative would have the same unavoidable impacts on terrestrial mammals as alternative IV. Unavoidable oil pollution of terrestrial mammals and their coastal habitats would be reduced in the Shelikof Strait area, but not in the lower Cook Inlet area where terrestrial mammals would be exposed to the same unavoidable impacts as with the proposal.

h. Impacts on Social Factors:

(1) Impacts on Population: With this alternative, population impacts on Port Lions and Kodiak would be removed and population impacts on Homer and Kenai-Soldotna would be moderated somewhat. Homer would still be the community in Cook Inlet with the most substantial population impacts. See section IV.A.2.h.(1).

Conclusion: The population impacts associated with this alternative would be similar to those described for alternative IV. Kodiak and Port Lions would not experience population impacts and the population impacts on Kenai and Soldotna would be moderated. Homer would sustain the most substantial population growth of the Cook Inlet communities.

Cumulative Effects: With this alternative only Homer would be significantly affected.

Unavoidable Adverse Effects: The effects on Homer would be the same as for the proposal (see sec. IV.A.2.h.(1)). Kenai and Soldotna would experience no adverse effects due to the small additions of population. Unavoidable adverse effects on Port Lions and Kodiak would be significantly moderated.

(2) Impacts on Sociocultural Systems: This alternative would result in a significant reduction in sociocultural impacts. Kodiak would experience fewer conflicts concerning joint fisheries, and OCS utilization of goods, services, and space. Local competition for jobs associated with OCS facility construction, potentially leading to racial conflict would be minimized. Impacts on the community of Homer would also be moderated by the reduced likelihood of major construction projects in the Homer area resulting from a smaller proposed lease sale.

Conclusion: This alternative would result in a reduction of impacts on the sociocultural systems of Kodiak, Port Lions, and Homer. Kenai-Soldotna would still experience largely beneficial, mild impacts.

Cumulative Effects: Cumulative effects on the communities of Kodiak and Port Lions would be minimized. Homer would likely experience moderate social conflict induced by continued Cook Inlet lease area exploration and possible development.

Unavoidable Adverse Effects: Moderate social conflict and controversy could occur in Homer. No unavoidable adverse effects for the other communities would likely occur.

(3) Impacts on Community Infrastructure: With this alternative, impacts would be confined to the Kenai and Homer areas. These impacts would be similar to those described for the proposal (sec. IV.A.2.h.(3)), but would be slightly reduced.

Conclusion: Community infrastructure impacts would be limited to the Kenai and Homer areas and are described in section IV.A.2.h.(3). There would be no impacts in the Kodiak and Port Lions areas.

Cumulative Effects: Cumulative impacts would be confined to the Kenai and Homer areas and are described in section IV.A.2.h.(3). There would be no impacts in the Kodiak and Port Lions areas.

Unavoidable Adverse Effects: See section IV.A.2.h.(3) for the Kenai and Homer areas only.

(4) Impacts on Subsistence: With this alternative, impacts on village subsistence use areas, both in Cook Inlet and Shelikof

Strait would be moderated. The reduction in exploratory drilling sites and deletion of blocks in Shelikof Strait would contribute to this low impact. See discussion for the proposal (sec. IV.A.2.h.(4)).

Cumulative Effects: With the addition of sale CI leased tracts, the statistical risk of oilspill contact would be reduced for Shelikof Strait villages, English Bay, and Port Graham. See discussion under the proposal (sec. IV.A.2.h.(4)).

Unavoidable Adverse Effects: This alternative would minimize the unavoidable adverse effects on subsistence use areas both in Cook Inlet and along Shelikof Strait.

i. Impacts on the State, Regional, and Local Economies: With this alternative, impacts would be confined to the Kenai and Homer areas. These impacts would be similar, but less severe, than those described for the proposal (sec. IV.A.2.i.) and would consist of relatively rapid increases in the economy and employment of each area.

Conclusion: Economic impacts on Kodiak and Port Lions would be insignificant. Impacts on the Kenai area would be mild. Impacts on the Homer area would be moderate, and would be characterized by relatively rapid increases in the area's economy and employment.

Cumulative Effects: Cumulative effects would be similar to those described for alternative IV (sec. IV.A.5.1.).

Unavoidable Adverse Effects: As in alternative IV, much the impact would be mild to moderate, relatively non-disruptive, permanent economic growth. As in the proposal (sec. IV.A.2.i.), mild economic growth could result in Kenai, moderate growth could occur in the Homer area.

j. Impacts on Cultural Resources: This alternative would result in a considerable reduction in risk from oilspills or other disturbance to cultural resources as compared to the proposal. The USGS oilspill risk analysis (appendix D) shows that risk to cultural resources would drop from high to low with this alternative.

Conclusion: This alternative would result in a reduction in risk to cultural resources. Impact would be low for this alternative.

Cumulative Effects: Cumulative effects on cultural resources would be minimal with this alternative.

Unavoidable Adverse Effects: The unavoidable adverse effects which would occur as a result of this alternative would be reduced from those of the proposal.

k. Impacts on Visual, Wilderness, and Recreation Resources:

Conclusion: With this alternative, impacts would be similar to those described for alternative IV (sec. IV.A.5.k.).

Cumulative Effects: Refer to section IV.A.5.k.

Unavoidable Adverse Effects: Refer to section IV.A.5.k.

l. Impacts on Land Status and Land Use:

Conclusion: With this alternative, impacts on land status and land use would be substantially the same as under the proposal (sec. IV.A.2.l.). However, no land status or land use impacts on the Kodiak Archipelago would likely occur because of deletion of the Shelikof Strait portion of the proposal.

Cumulative Effects: Same as above.

Unavoidable Adverse Effects: Same as above.

m. Impacts on Transportation Systems:

Conclusion: Impacts resulting from alternative V would be substantially the same as described in section IV.A.5.m.

Cumulative Effects: See section IV.A.5.m.

Unavoidable Adverse Effects: See section IV.A.5.m.

n. Impacts on the Alaska Coastal Management Program:

Conclusion: With this alternative, impacts on coastal zone management would be the same as those described for alternative IV. Refer to section IV.A.5.i.

Cumulative Effects: Same as above.

Unavoidable Adverse Effects: Same as above.

o. Impacts on Water Quality:

Conclusion: Under alternative V, the impacts on water quality would be substantially the same as under the proposal (sec. IV.A.2.o.). Most water quality effects would be limited to the Cook Inlet area.

Cumulative Effects: Same as above.

Unavoidable Adverse Effects: Same as above.

p. Impacts on Air Quality:

Conclusion: Impacts which would occur as a result of this alternative would be the same as those of the proposed action (sec. IV.A.2.p.).

Cumulative Effects: The cumulative effects which would occur as a result of this alternative would be the same as those of the proposed action.

Unavoidable Adverse Effects: The unavoidable adverse impacts which would occur as a result of this alternative would be the same as those of the proposed action (sec. IV.A.2.p.).

7. Alternative VI (68 blocks): Modify the proposal by deletion of the 85 blocks in lower Cook Inlet: The following sections assess the impacts of further oil and gas leasing in only Shelikof Strait (see fig. II.B.6.a.-1).

a. Impacts on Vulnerable Coastal Habitats: This alternative poses risks to the lower Cook Inlet and Shelikof Strait coastal habitat that are similar to the impacts of the entire proposal. The most likely number of spills in Shelikof Strait is three; however, another seven spills are most likely to result from the past leasing and existing tanker routes in lower Cook Inlet (appendix D). The distribution of the coastal impact of these is similar to the impact of the proposal because the spills may originate in both lower Cook Inlet and Shelikof Strait.

Conclusion: The leasing in only Shelikof Strait, as proposed with alternative VI, poses comparatively similar risks to the coastal habitats in Shelikof Strait and comparatively great risks to Marmot Bay as discussed in the proposal (sec. IV.A.2.a.).

Cumulative Effects: In comparison with the proposal, alternative VI poses approximately equal cumulative risks to the coastal habitats in Shelikof Strait and lower Cook Inlet.

Unavoidable Adverse Effects: The unavoidable impacts of this alternative are similar to those associated with the entire proposal (sec. IV.A.2.a.).

b. Impacts on Commercial and Sportfish: Deletion of the lower Cook Inlet blocks with this alternative could result in reduced potential oil pollution impacts on fin and shell fish populations and habitats in the lower Cook Inlet. Oilspill risk probabilities for pink salmon spawning habitats and juvenile foraging areas are high already due to existing leasing and tankering activities in Cook Inlet. This alternative would add no further risk.

Conclusion: Deletion of the lower Cook Inlet blocks could result in reduced potential impacts from oil pollution on pink salmon spawning and rearing habitats. However, these areas are at comparatively high risk from existing hydrocarbon activities. Fish populations and habitats in Shelikof Strait could suffer the same potential impacts as described for the proposal (sec. IV.A.2.b).

Cumulative Effects: Activities related to this alternative in addition to existing oil and gas activities in Cook Inlet could result in somewhat reduced impacts on fish populations and habitats in the lower Cook Inlet and Barren Islands areas from those cumulative effects described in section IV.A.2.b. (proposal). However, this alternative would probably have about the same degree of cumulative effects as the proposal on fin and shellfish populations occurring in the Shelikof Strait.

Unavoidable Adverse Effects: Those unavoidable impacts described for the proposal (sec. IV.A.2.b.) could be reduced for lower Cook Inlet populations and habitats with this alternative. However, the same unavoidable effects described for the proposal would probably occur for Shelikof Strait fish populations.

c. Impacts on Commercial Fishing: With this alternative, impacts on commercial fishing in Shelikof Strait would be the same as discussed for the proposal (sec. IV.A.2.c.). Fisheries located from Uganik to Malina Bays face the greatest risk of being adversely affected by an oilspill. Impacts could include fouled fishing gear and fish, and competition for ocean space, dock space, labor, and materials. Refer to sections IV.A.2.b. and IV.A.2.c. (proposal) for a more detailed discussion of these impacts.

While the impacts assessed for lower Cook Inlet may be reduced with this alternative, the level of oil and gas related activities presently occurring in the area, and future activities envisioned for the area would probably result in only slightly reduced impacts. There may be some reduction of potential impacts in the Polly Creek area of Cook Inlet (clams) and Kamishak Bay (crab fishing), but, overall, impacts would not be significantly reduced.

Cumulative Effects: Cumulative impacts would be essentially the same as those discussed for the proposal (sec. IV.A.2.c.).

Unavoidable Adverse Effects: With the exception of lower Cook Inlet, where impacts may be reduced, unavoidable and adverse impacts would be similar to those identified for the proposal (sec. IV.A.2.c.).

d. Impacts on Marine and Coastal Birds: This alternative could reduce potential oil pollution impacts on marine and coastal bird populations and habitats within the lower Cook Inlet area and the Barren Islands. Oilspill risk probabilities for coastal habitats and offshore foraging areas are significantly reduced (appendix D, table 26). Coastal habitats in Kamishak Bay, Augustine Island, Anchor Point, and the Barren Islands are less likely to be contacted by oil if the lower Cook tracts are not leased. However, these areas are at high risk from the existing leasing and existing tankering activities as well as being at risk from oil pollution or disturbance from other projects such as the proposed State lease sale 35 activities.

Bird populations and habitats in Shelikof Strait area are at high risk from oilspills with this alternative. If a large spill occurs, the bird populations that occur in the bays, nearshore areas, and offshore foraging areas of Shelikof Strait could suffer high mortalities as indicated by the high oilspill probability risks, 46-49 percent for this alternative (appendix D, tables 26 and 29, fig. D).

This alternative could reduce disturbance of nesting birds in the lower Cook Inlet area by reducing marine and air traffic somewhat from what would occur with the proposal. However, disturbance of bird colonies in the Shelikof Strait could still occur.

Conclusion: Deletion of the lower Cook Inlet tracts could reduce the potential impacts from oil pollution and disturbance on marine and coastal birds and their habitats in that area and the Barren Islands. However, these areas are at comparatively high risk from existing and proposed hydrocarbon activities. Bird populations and habitats in Shelikof Strait could suffer the same potential impacts as described in the proposal. This alternative would be as likely to have major impacts as the proposal.

Cumulative Effects: This alternative could reduce somewhat the combined effects of the proposal, plus the existing lease area and existing tankering on bird populations and habitats in the lower Cook Inlet and Barren Islands areas from those cumulative effects described in the proposal. However, this alternative will probably have about the same degree of cumulative effects as the proposal on bird populations occurring in the Shelikof Strait areas (see tables 27, 28, 30, and 31).

Unavoidable Adverse Effects: Those unavoidable impacts described in the proposal could be reduced for the lower Cook Inlet and Barren Islands populations and habitats with this alternative. However, the same unavoidable effects described in the proposal would probably occur for the Shelikof Strait bird populations with this alternative.

e. Impacts on Marine Mammals: Refer to section IV.A.2.e. for a general discussion of impacts. Alternative VI would expose the northern and northwestern Kodiak Archipelago to high spill risks which are substantially less than that of the proposal (appendix D, 35% chance, alternative VI versus 48% chance, alternative I; tables 26 and 8, respectively), but greater than those of alternative IV or V (17% and 11% chance respectively, area D). Western shores of Shelikof Strait would be exposed to less chance of contact compared to the proposal (appendix D, 11% chance, alternative VI versus 17% alternative I; tables 26 and 8, respectively, area E), but greater than would be incurred under alternative IV or V (5% and 4% chance, respectively). Marine mammal habitats in lower Cook Inlet (e.g., Kamishak Bay-Augustine Island, Anchor Point, and southwestern Kenai Peninsula) would be afforded additional protection. Appendix D, table 26 shows that the probability of spill contact over the life of the field in the Kamishak Bay-Augustine Island nearshore environments (area H) would be 2 percent as compared to 33 percent under the proposal. Similarly, the Anchor Point area (area G) would be subjected to virtually no chance of spills as compared to 13 percent of the proposal. Also, marine mammal habitats of the Barren Islands would be subjected to less risk, at a substantially lower probability than would be effected by the proposal or alternative IV (appendix D; alternative I; 11% chance; alternative IV; 10% chance; alternative VI; 1% chance, tables 8, 9, and 26, respectively, area C).

Conclusion: Alternative VI would reduce potential spill effects (see sec. IV.A.2) on sea otter, harbor seal, and sea lions and their habitats of lower Cook Inlet and the Barren Islands, particularly those of the Kamishak Bay and Barren Island areas below levels which would be incurred under the proposal. Spill contact rates of the northern Kodiak Archipelago and Shelikof Strait marine mammal habitats may be reduced below those of the proposal but not to the extent that could be accomplished through alternatives IV and V.

Due to probable tanker traffic to eastern Kodiak Island, spill risks to Portlock Bank would probably be higher under this alternative than what would be incurred under alternative IV and V. Therefore, in consideration of the probable ecological importance of Portlock Bank and nearshore marine habitats east of Kodiak Island to sea lions and fur seals, and of the importance of the northern Kodiak Archipelago to harbor seals and sea otters, this alternative would probably not assure as much overall long-term protection to marine mammals as would alternative IV or V. It is possible that noise and disturbance associated with exploration, development, and production phases of the proposed sale would affect sea lions and harbor seals, in particular those of Shelikof Strait and eastern Kodiak Island.

Cumulative Effects: Cumulative (alternative VI plus existing tracts) probabilities of spill contact for marine mammal habitats would remain moderate to high for most areas of marine mammal use, although these cumulative probabilities (appendix D, table 27) are 5-10 percent less than the cumulative probabilities that would be associated with the proposal (appendix D, table 8), and generally constitute a greater reduction than would be achieved by alternatives IV or V (compare to cumulative probabilities, appendix D, tables 9 and 10) except for the north Kodiak Archipelago (area D) and the Shelikof Strait (area E). Therefore, alternative VI may provide potential for reducing long-term cumulative oilspill related direct and indirect effects (sec. IV.A.5.e.) on marine mammals of lower Cook Inlet, but not necessarily for those of the northern Kodiak Archipelago (probably an area of greatest sea otter density) or Shelikof Strait. Since a pipeline to and tanker terminal on eastern Kodiak Island would be likely under this alternative, localized cumulative disturbance of harbor seals, sea lions, or sea otters in the Marmot Bay area as a result of this alternative could be higher than what would be incurred under alternative IV or V.

Unavoidable Adverse Effects: If the field goes into production, this alternative is likely to result in direct mortality of sea otters, particularly in the north-northwestern Kodiak Archipelago as the result of oilspills. Such effects would generally be less than what would be expected under the proposal, but greater than under alternative IV or V. It is possible that localized habitat deterioration and/or food source loss as a result of spills would occur, at least temporarily for sea otters and harbor seals of the northern Kodiak Archipelago. It is possible that unavoidable disturbance of sea lion or harbor seal concentration would occur as a result of long-term changes in transportation systems, localized impacts of facility construction, or localized short-term effects of aircraft, boat, or industrial noise. The Information to Lessee on Birds and Mammals (sec. II.B.1.b.), which recommends that the lessee operate aircraft and vessels no closer than 1 mile from observed wildlife or known wildlife concentration areas would help to minimize behavioral disturbance of a short-term localized nature, especially at hauling areas and breeding rookeries.

f. Impacts on Endangered Species and Non-Endangered Cetaceans: See section IV.A.2.f. for a general discussion of impacts. Alternative VI would reduce oilspill risk and potential effects on cetaceans frequenting the northern Kodiak Archipelago below that of the proposal (35% chance alternative VI vs. 48% chance, alternative I; appendix D, tables 26 and 8, area D), but not below that which would occur for alternative IV or V (17% and 11% chance, respectively). (NOTE: unless otherwise specified, oilspill risk analyses made in this section refer to probabilities conditional on the development of a production field and to spill contact rates within 10 days of simulated launch.) However, this alternative would subject the Barren Islands and eastern Kenai Peninsula to lower oilspill risk than would alternatives I, IV, and V. Areas of whale occurrence on the eastern shores of Shelikof Strait would be at 5-9 percent chance of oilspill contact for this alternative (appendix D, table 29, nos. 12, 13, 14) as compared to 1-4 percent for alternative IV. Therefore, alternative VI would minimize the potential for direct or indirect oilspill effects (sec. IV.A.2.f.) to areas which probably receive the most use by gray whales as compared to other alternatives but would not afford as much protection to areas of cetacean occurrence in the northern Kodiak Archipelago and Shelikof Strait as would alternatives IV or V. Appendix D, table 26, shows that the probability of spill contact over the life of the field in the Kamishak Bay-Augustine Island nearshore environments (area H) would be 2 percent compared to 33 percent under the proposal, and 29 and 26 percent under alternatives IV and V. Thus, direct and indirect effects of oilspills on wintering beluga whales would be less likely under alternative VI than under alternatives I, IV, or V. Localized oilspills and disturbance may occur in the vicinity of a tanker terminal located on the eastern side of Kodiak Island. It is possible, therefore, that cetaceans of eastern Kodiak Island habitats also would sustain negative effects as a result of spills or disturbance that may be associated with this alternative. Overall, effects would possibly exceed those described for alternatives IV or V.

Conclusion: It is possible that endangered and non-endangered cetaceans may sustain direct and indirect effects due to oilspill occurrence in areas of high risk of contact such as the northern Kodiak Archipelago. Risk of spill contact and effects on beluga wintering areas of lower Cook Inlet such as Kamishak Bay and gray whale habitats on the eastern side of the Kenai Peninsula would be substantially less than those under the proposal. Localized effects of oilspills and disturbances may be sustained in the vicinity of a tanker terminal located on the eastern side of Kodiak Island. It is possible, therefore, that cetaceans of eastern Kodiak Island habitats will sustain negative effects as a result of oilspills and disturbance that may be associated with this alternative. This alternative would not cause significant impacts on endangered birds.

Cumulative Effects: Examination of appendix D, tables 8, 9, 10, and 26, indicates that alternative VI would lower cumulative (alternative VI plus existing lease sale) oilspill risk below that which would result from the proposal but not substantially below that which would result from alternatives IV and V for the eastern Kenai Peninsula and Barren Islands. This alternative would have higher (59% vs. 48%) cumulative spill probability on the northern Kodiak Archipelago than alternatives IV and V. The cumulative probability of oilspill contact in Kamishak Bay beluga whale wintering areas would remain high (67%) under this alternative (appendix D, table 26, area H). Therefore, alternative VI would not reduce cumulative oilspill effects on cetaceans in lower Cook Inlet and Shelikof Strait (sec. IV.A.2.f.) any more than alternatives IV and V.

This alternative would be expected to contribute to localized cumulative oilspills, noise, and other disturbance on the eastern side of Kodiak Island, particularly as may be associated with the tanker terminal near Marmot Bay and tankering of crude oil over the Portlock Bank.

Unavoidable Adverse Effects: Although similar qualitatively, the degree of unavoidable effects on endangered and non-endangered whales as a result of this alternative are unknown. The Information to Lessee on Birds and Mammals (sec. II.B.1.b.), which recommends that the lessee operate aircraft and vessels no closer than 1 mile from observed wildlife or known wildlife concentration areas would help to minimize behavioral disturbance of a short-term, localized nature. No unavoidable adverse impacts would be expected to be sustained by Aleutian Canada geese as a result of this alternative.

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g. Impacts on Terrestrial Mammals: This alternative would reduce oilspill risks to terrestrial mammals and their coastal habitats in the lower Cook Inlet area especially in Kamishak Bay. Brown bear spring-use areas in Kamishak Bay would face lower risk from oil contamination with this alternative. Coastal wintering areas for moose would also face less risk from oil pollution along the coast near Anchor Point. However, coastal habitats in Shelikof Strait showing a high probability of risk from oilspills, such as the Kukak Bay brown bear stream- and spring-use areas, and Raspberry and Uganik Islands deer wintering areas (graphic 9), with the proposal would also be at high risk with this alternative (refer to sec. IV.A.2.g.). The development scenario for this alternative includes an onshore pipeline from Chernof Point to Talnik Point and tanker terminal facilities at Talnik Point. There would be no gas pipeline to Nikiski; thus, impact to terrestrial habitat on the Kenai Peninsula would not occur. Disturbance of terrestrial mammals and their habitats due to onshore activities would still occur on Kodiak Island with this alternative as with the proposal (sec. IV.A.2.g.).

Conclusion: This alternative could reduce potential impacts on terrestrial mammals and their coastal habitats in the lower Cook Inlet portion. The terrestrial mammals in the Shelikof Strait portion of the proposed lease area would face the same risk as described in section IV.A.2.g. (proposal). Overall, impacts on terrestrial mammals would probably be minor.

Cumulative Effects: Although lower Cook Inlet terrestrial mammal resources would be at less risk from oil pollution with this alternative than with the proposal or with alternatives IV and V, the combined effects of this alternative plus the effects of the existing lower Cook Inlet lease area and existing tankering would be about the same as the proposal for the lower Cook Inlet portion of the proposed lease area. This alternative would have about the same cumulative effects on terrestrial mammal resources of the Shelikof Strait area as the proposal.

Unavoidable Adverse Effects: This alternative would have the same unavoidable adverse impacts on Shelikof Strait terrestrial mammals populations as the proposal. However, fewer terrestrial mammals would be unavoidably affected in the lower Cook Inlet area than with the proposal or with alternative IV or V.

h. Impacts on Social Factors:

(1) Impacts on Population: This alternative would result in the same impacts as those described for the proposal (sec. IV.A.2.h.(1)) for Kodiak and Port Lions. For Kenai, Soldotna, and Homer, population impacts would be eliminated.

Conclusion: Population impacts would be the same as described for the proposal (sec. IV.A.2.h.(1)) for Kodiak and Port Lions. These impacts would be major for Port Lions and less serious for Kodiak. This alternative would eliminate population impacts on Homer, Kenai, and Soldotna.

Cumulative Effects: Cumulative impacts would be the same as the proposal for Kodiak and Port Lions (see table IV.A.2.h.(1)-2). For Homer, Kenai, and Soldotna, cumulative impacts would be equal to the base case. See table IV.A.2.h.(1)-3.

Unavoidable Adverse Effects: For Kodiak and Port Lions, unavoidable adverse effects would be similar to those described in section IV.A.2.h.(1) (proposal). There would be no unavoidable adverse effects for Homer, Kenai, and Soldotna.

(2) Impacts on Sociocultural Systems: Deletion of blocks and associated exploratory and development activity in Cook Inlet would reduce the potential conflict associated with the proposal for the community of Homer. Impacts on Kodiak, Port Lions, and other Shelikof Strait communities would continue. See discussion under the proposal, sections IV.A.2.h.(1) and (3).

Conclusion: This alternative is equivalent to alternative I (the proposal) in its effects on Kodiak, Port Lions, and other Shelikof Strait communities. Impacts on Homer and Kenai-Soldotna would be moderate.

Cumulative Effects: Cumulative effects would be major in Kodiak-Port Lions, and would be eliminated in Homer, Kenai, and Soldotna.

Unavoidable Adverse Effects: Unavoidable adverse effects resulting from this alternative would include social conflict leading perhaps to increased racial conflict, moderate job shifting during construction seasons for Kodiak, Port Lions, and perhaps mild job shifting in other Shelikof Strait villages. Unavoidable adverse effects in Homer would be eliminated.

(3) Impacts on Community Infrastructure: Alternative VI eliminates all impacts on Kenai and Homer areas. Impacts on the community infrastructure in the Kodiak and Port Lions areas would be as described for the proposal (sec. IV.A.2.h.(3)).

Conclusion: Impacts on community infrastructure in the Kenai and Homer areas would be non-existant. Impacts to the Kodiak and Port Lions areas would be as described for the proposal (sec. IV.A.2.h.(3)).

Cumulative Effects: Cumulative impacts on community infrastructure in the Kenai and Homer areas would be non-existent. Cumulative impacts on Kodiak would be about the same as those outlined for the proposal (sec. IV.A.2 h.(2)).

Unavoidable Adverse Effects: Impacts would be limited to the Kodiak and Port Lions areas as described in section IV.A.2.h.(3).

(4) Impacts on Subsistence: In spite of the fact that petroleum-related activity in Shelikof Strait would be about the same as for the proposal, the risk calculations on subsistence use areas for this alternative show it to be less hazardous to subsistence areas in Shelikof Strait than the proposal itself. Cook Inlet subsistence use areas also face less risk under this alternative. See figure IV.A.1.d.-9.

This reduction in risk to subsistence use and take areas would reduce the likelihood of the disruption of local village economies resulting from an oilspill.

Cumulative Effects: When both the cumulative effect of sale CI leasing activity and the effect of existing and proposed tankering are calculated, using the oilspill risk analysis model, two areas on either side of Shelikof Strait

(Kupreonof Strait and Cape Gull) show high oilspill risk, and five areas along the strait at Ugak Bay, Uganik Island, Black Cape, Afognak Island, Cape Kulak, and Douglas Reef show medium risk (fig. IV.A.d.-14).

In Cook Inlet, two areas in Kamishak Bay and Augustine Island show high risk of oilspill contact, and four points show medium risk. The cumulative case of this alternative is less hazardous than the cumulative case with the proposal. With this cumulative case, two areas along Shelikof Strait would be at high risk, only one of which would result in oilspill impacts on the subsistence use area of villages located along Kupreanof Strait. This minimizes the likelihood of disruption of subsistence activities and take in the event of an oilspill.

Under the cumulative case, seven areas in Cook Inlet show high oilspill risk including two close to English Bay and Port Graham (Ushagat Island and English Bay). With this cumulative case only three areas in Kamishak Bay (away from heavily used subsistence areas) show high risk of oilspill contact, thus reducing the likelihood of disturbance to these village economies and their residents and activities.

Unavoidable Adverse Effects: Under this alternative, the unavoidable adverse effects of one or more probable oilspills, and their temporary to long-term disruption of subsistence use and take, would be minimized.

i. Impacts on the State, Regional and Local Economies: Alternative VI would eliminate all impacts on the Kenai and Homer areas because development would occur in the near Kodiak and Port Lions areas of the Shelikof Strait. Since gas would be reinjected, most economic impacts on Homer and Kenai areas would be eliminated. Impacts on Kodiak and Port Lions would remain as described for the proposal (sec. IV.A.2.i.).

Conclusion: Mild economic impacts in terms of employment and income would be likely in the Kenai and Homer areas. As for the proposal, major economic and employment impacts are likely in the Port Lions area, and mild impacts would likely occur in Kodiak.

Cumulative Effects: Cumulative impacts would be similar to those described in section IV.A.2.i. (proposal).

Unavoidable Adverse Effects: Unavoidable adverse impacts may or may not exist depending on ones view of the implications of an economic boom in the Port Lions area.

j. Impacts on Cultural Resources: Alternative VI could result in reduced risks to cultural resources. Reduction in traffic through Stevenson Entrance and Kennedy Entrance could reduce impacts on cultural resources of the Barrier Islands (graphic 13).

Conclusion: This alternative would result in improved conditions for preservation of cultural resources compared to the proposal. Impact is low for this alternative.

Cumulative Effects: Cumulative effects on cultural resources would be greatly reduced with this alternative.

Unavoidable Adverse Effects: The unavoidable adverse effects resulting from this alternative would be reduced compared to those described for the proposal (sec. IV.A.2.j.).

k. Impacts on Visual, Wilderness, and Recreation Resources:

Conclusion: This alternative would result in a reduction of impacts on the visual, wilderness, and recreation resources of Cook Inlet (see sec. IV.A.2.k.). Since petroleum-related activity in Shelikof Strait would be similar to that described for the proposal, impacts on visual, wilderness, and recreation resources would be the same as for the proposal (sec. IV.A.2.k.).

Cumulative Effects: Cumulative effects on visual, wilderness, and recreation resources on Cook Inlet would be slightly reduced with this alternative. Effects of these resources on Shelikof Strait, Kodiak Island, and the Alaska Peninsula would be as described in section IV.A.2.k. (proposal).

Unavoidable Adverse Effects: Unavoidable adverse effects would be the same as those described in section IV.A.2.k. but would be slightly reduced for Cook Inlet.

l. Impacts on Land Status and Land Use:

Conclusion: With alternative VI, impacts on land status and land use of the Kodiak Archipelago would be substantially the same as under the proposal (sec. IV.A.2.l.). Impacts on the Kenai Peninsula area would include those described for alternative I (sec. IV.A.2.l.) regarding expansion of support and supply base activity at Homer and the possibility of spillover land use impacts on Homer.

Cumulative Effects: Same as above.

Unavoidable Adverse Effects: Same as above.

m. Impacts on Transportation Systems: With this alternative, material flowing into the city of Anchorage and the Kenai Peninsula would be cut by nearly 50 percent. Additionally, there would be no need for an extensive labor force on the Kenai Peninsula as there would be no need to construct any major facilities.

With this alternative, impacts on Port Lions would be as great or greater than the proposal. Some increase in traffic in the Port Lions area could occur as a result of a natural tendency to support the entire operation from the closest possible support base. However, even in this case, routine supply operations from Port Lions would not be likely.

Conclusion: As a result of this alternative, impacts would be substantially reduced in Anchorage and the Kenai Peninsula. Impacts on Port Lions would be the same as those described for the proposal.

Cumulative Effects: See section IV.A.2.m. (proposal).

Unavoidable Adverse Effects: Unavoidable adverse impacts would be the same as those described in section IV.A.2.m., with the exception that this alternative would cause no traffic congestion on the Sterling Highway and would cause no increase in Cook Inlet tanker traffic.

n. Impacts the Alaska Coastal Management Program:

Conclusion: With alternative VI, impacts on the State Coastal Zone Management Program, the Kodiak Island Borough District Management Program (CMP), and Kenai Peninsula Borough CMP would be similar to those impacts described for the proposal (sec. IV.A.2.n.). The Kodiak Island Borough could be the site of an exploration support base instead of the Kenai Peninsula Borough because the lease tracts would be located principally in the Shelikof Strait, and no oil terminal and/or processing facilities would be located on the coastal zone of the Kenai Peninsula Borough with this alternative. However, other aspects of the petroleum development scenario described and assessed in section IV.A.2.n. (proposal), apply to alternative VI.

Cumulative Effects: Cumulative effects would be the same as described in section IV.A.2.n., with exceptions noted above.

Unavoidable Adverse Effects: Same as above.

o. Impacts on Water Quality:

Conclusion: With this alternative, impacts on water quality would be substantially the same as described for the proposal (sec. IV.A.2.o.). Most water quality impacts would be limited to the Shelikof Strait area.

Cumulative Effects: Same as above.

Unavoidable Adverse Effects: Same as above.

p. Impacts on Air Quality: With this alternative, impacts on air quality would be localized on the northern coastline of Kodiak Island between Chernof Point and Talnik Point. Since there would be no Anchor Point facility, impacts on air quality would be eliminated for this area.

Conclusion: Air emissions which would occur as a result of this alternative would be localized on the northern coastline of Kodiak Island.

Cumulative Effects: The cumulative effects which would occur as a result of this alternative would be the same as those of the proposal (sec. IV.A.2.p.) except there would be no petroleum-related air quality impacts in the Anchor Point area.

Unavoidable Adverse Effects: The unavoidable adverse impacts which would occur as a result of this alternative would be the same as those of the proposal (sec. IV.A.2.p.).

B. Analysis of Other Block Deletion Alternatives

Recommendations for block deletions were received from eight agencies, organizations, and individuals as a result of the DEIS review and public hearing processes. These block deletion recommendations have been grouped, where a common pattern or justification for deletion exists, and synthesized for analysis as three block deletion alternatives. This section contains a description of the block deletion alternatives and an analysis of environmental impacts in comparison with the environmental analysis performed for the proposed action and alternatives thereto, as appropriate. Resource estimates for the alternatives may be less than the proposed action or respective alternative due to block deletion; however, the extent to which resource estimates change as a result of block deletion is unknown. Consequently, the developmental scenarios for the leasing configurations resulting from block deletion are assumed as in the proposed action or respective alternative. Although the results of the oilspill risk analysis were used for this analysis where applicable, no additional computerized analysis was performed for specific block deletion alternatives.

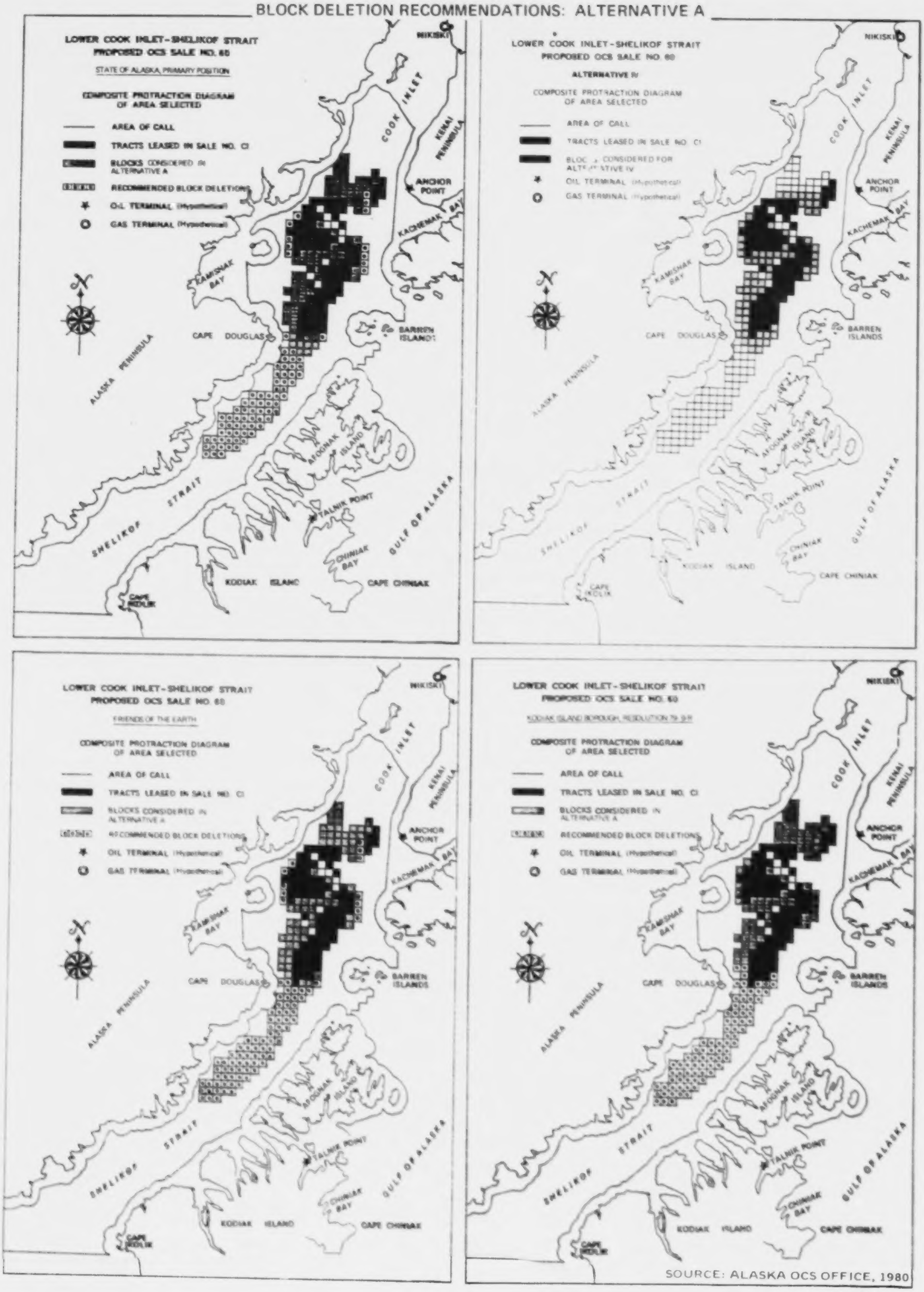
1. Block Deletion Alternative A: This alternative involves modification of the proposed sale area by the deletion of 12 blocks within lower Cook Inlet and 68 blocks in Shelikof Strait, for a total deletion of 80 blocks. The alternative proposes the leasing of 73 blocks within lower Cook Inlet, based on the definition of demarcation between lower Cook Inlet and Shelikof Strait as contained in alternative IV. The alternative is based on the recommendations of the State of Alaska, the Kodiak Island Borough, and Friends of the Earth. For the purpose of this analysis, the alternative is discussed in terms of these recommendations and the justification submitted for modifying the proposed sale area. The respective recommendations are shown on figure IV.B.1.-1, shown for comparison with alternative IV, the basis for the State of Alaska's position. The alternative is shown on figure IV.B.1.-2. Please note the State proposal includes the recommendation for adding the 19 blocks in the northern part of the lease sale area deleted for the analysis of alternative IV (as well as alternative V). The block deletion recommendations are grouped because of similarity in suggesting deletion of the Shelikof Strait blocks, although the specific demarcation line for the Strait is somewhat different in each proposal. Block deletion recommendations in lower Cook Inlet by the State and Friends of the Earth are identical. The Kodiak Island Borough has no recommendation for block deletions in lower Cook Inlet. The number of blocks recommended for deletion are as follows:

	Shelikof Strait	Lower Cook Inlet	Total
State of Alaska	68	12	80
Friends of the Earth	75	12	87
Kodiak Island Borough	81	0	81

Block deletions in the Shelikof Strait are justified on the basis of inadequate biological research and data base; the importance of the Strait to marine and avian resources generally, to bottomfish populations particularly, and to fisheries; the lack of a Coastal Zone Management Plan for the Kodiak Island Borough; shortcomings in current oilspill cleanup capabilities; geologic hazards; and the strong opposition by local governments. The blocks proposed for deletion in lower Cook Inlet are justified as a function of impact reduction to marine and avian resources and fisheries generally. The block deletion proposal on the west side of lower Cook Inlet is justified on the basis of reducing a substantial oilspill threat to State resources; whereas, the recommendations near Augustine Island are based on substantial geophysical hazard. No justification is rendered by the State for recommending the addition of the 19 northern blocks of the lease sale area to alternative IV, blocks which had been deleted for analysis purposes based on concerns of Cook Inlet fishermen.

Figure IV.B.1.–1

BLOCK DELETION RECOMMENDATIONS: ALTERNATIVE A


LOWER COOK INLET–SHELIKOF STRAIT
PROPOSED OCS SALE NO. 60
STATE OF ALASKA, PRIMARY POSITION
COMPOSITE PROTRACTION DIAGRAM OF AREA SELECTED
AREA OF CALL
TRACTS LEASED IN SALE NO. CI
BLOCKS CONSIDERED IN ALTERNATIVE A
RECOMMENDED BLOCK DELETIONS
OIL TERMINAL (Hypothetical)
GAS TERMINAL (Hypothetical)
NIKISKI
COOK INLET
KENAI PENINSULA
ANCHOR POINT
KACHEMAK BAY
KAMISHAK BAY
CAPE DOUGLAS
BARREN ISLANDS
ALASKA PENINSULA
AFOGNAK ISLAND
SHELIKOF STRAIT
TALNIK POINT
GULF OF ALASKA
CHINIAK BAY
KODIAK ISLAND
CAPE CHINIAK
CAPE IKOLIK
LOWER COOK INLET–SHELIKOF STRAIT
PROPOSED OCS SALE NO. 60
ALTERNATIVE IV
COMPOSITE PROTRACTION DIAGRAM OF AREA SELECTED
AREA OF CALL
TRACTS LEASED IN SALE NO. CI
BLOCKS CONSIDERED FOR ALTERNATIVE IV
OIL TERMINAL (Hypothetical)
GAS TERMINAL (Hypothetical)
LOWER COOK INLET–SHELIKOF STRAIT
PROPOSED OCS SALE NO. 60
FRIENDS OF THE EARTH
COMPOSITE PROTRACTION DIAGRAM OF AREA SELECTED
AREA OF CALL
TRACTS LEASED IN SALE NO. CI
BLOCKS CONSIDERED IN ALTERNATIVE A
RECOMMENDED BLOCK DELETIONS
OIL TERMINAL (Hypothetical)
GAS TERMINAL (Hypothetical)
LOWER COOK INLET–SHELIKOF STRAIT
PROPOSED OCS SALE NO. 60
KODIAK ISLAND BOROUGH, RESOLUTION 79-9-R
COMPOSITE PROTRACTION DIAGRAM OF AREA SELECTED
AREA OF CALL
TRACTS LEASED IN SALE NO. CI
BLOCKS CONSIDERED IN ALTERNATIVE A
RECOMMENDED BLOCK DELETIONS
OIL TERMINAL (Hypothetical)
GAS TERMINAL (Hypothetical)

SOURCE: ALASKA OCS OFFICE, 1980

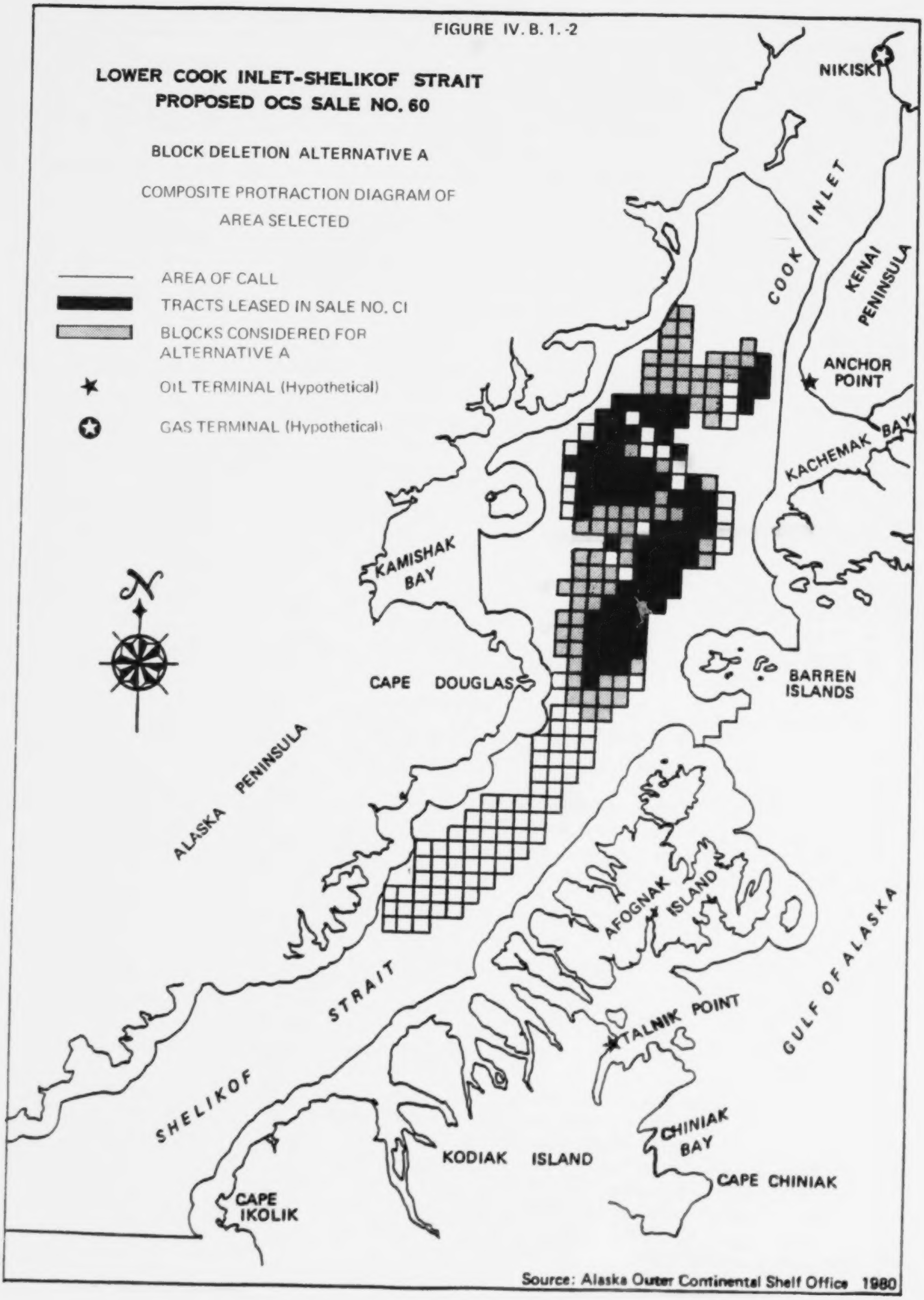


FIGURE IV. B. 1.-2

LOWER COOK INLET-SHELIKOF STRAIT PROPOSED OCS SALE NO. 60

BLOCK DELETION ALTERNATIVE A

COMPOSITE PROTRACTION DIAGRAM OF AREA SELECTED

AREA OF CALL
TRACTS LEASED IN SALE NO. CI
BLOCKS CONSIDERED FOR ALTERNATIVE A
OIL TERMINAL (Hypothetical)
GAS TERMINAL (Hypothetical)
NIKISKI
COOK INLET
KENAI PENINSULA
ANCHOR POINT
KACHEMAK BAY
KAMISHAK BAY
CAPE DOUGLAS
BARREN ISLANDS
ALASKA PENINSULA
AFOGNAK ISLAND
GULF OF ALASKA
SHELIKOF STRAIT
TALNIK POINT
CHINIAK BAY
CAPE CHINIAK
KODIAK ISLAND
CAPE IKOLIK
N

Source: Alaska Outer Continental Shelf Office 1980

A plausible reason for the recommendation may be the proximity of the blocks to State lease sale 35, scheduled for the first quarter of 1981.

Environmental Impacts: The block deletion proposal of the Kodiak Island Borough is identical to alternative V. In fact, the block deletions represented by alternative V came about in response to the Borough's definition of the northern extremity of Shelikof Strait. Consequently, the impacts within the lease sale area of deleting the Shelikof Strait so defined are as contained in the analysis of alternative V. The only difference between the proposals of the State and Friends of the Earth exists in the demarcation of Shelikof Strait from lower Cook Inlet. Within the lease sale area, the impacts of deleting the Shelikof Strait as defined by the State are as contained in the analysis of alternative IV. The effects of the block deletion proposal in the Shelikof Strait by Friends of the Earth was substantially analyzed in alternative V.

In lower Cook Inlet, the block deletion proposals of the State and Friends of the Earth are identical, consisting of five blocks east of Augustine Island, abutting OCS lease sale CI tracts, and seven noncontiguous blocks in waters off Kachemak Bay. The environmental impacts by such block deletions may be somewhat reduced from those assessed for alternatives IV or V due to oil weathering and dispersal as a function of OCS activities operating at an increased distance from shore, but it is impossible to determine the nature or extent of impact reduction from the deletion of so few blocks. It is likely such block deletions will produce little or no difference in the impacts already assessed in the analysis of alternatives IV and V. There may be no significant difference in impacts from those assessed in alternative IV by the addition of the 19 contiguous northerly blocks to the alternative, as proposed by the State. However, in the cumulative case, adding the northerly tracts could increase impacts to resources associated with Anchor Point and Kamishak Bay.

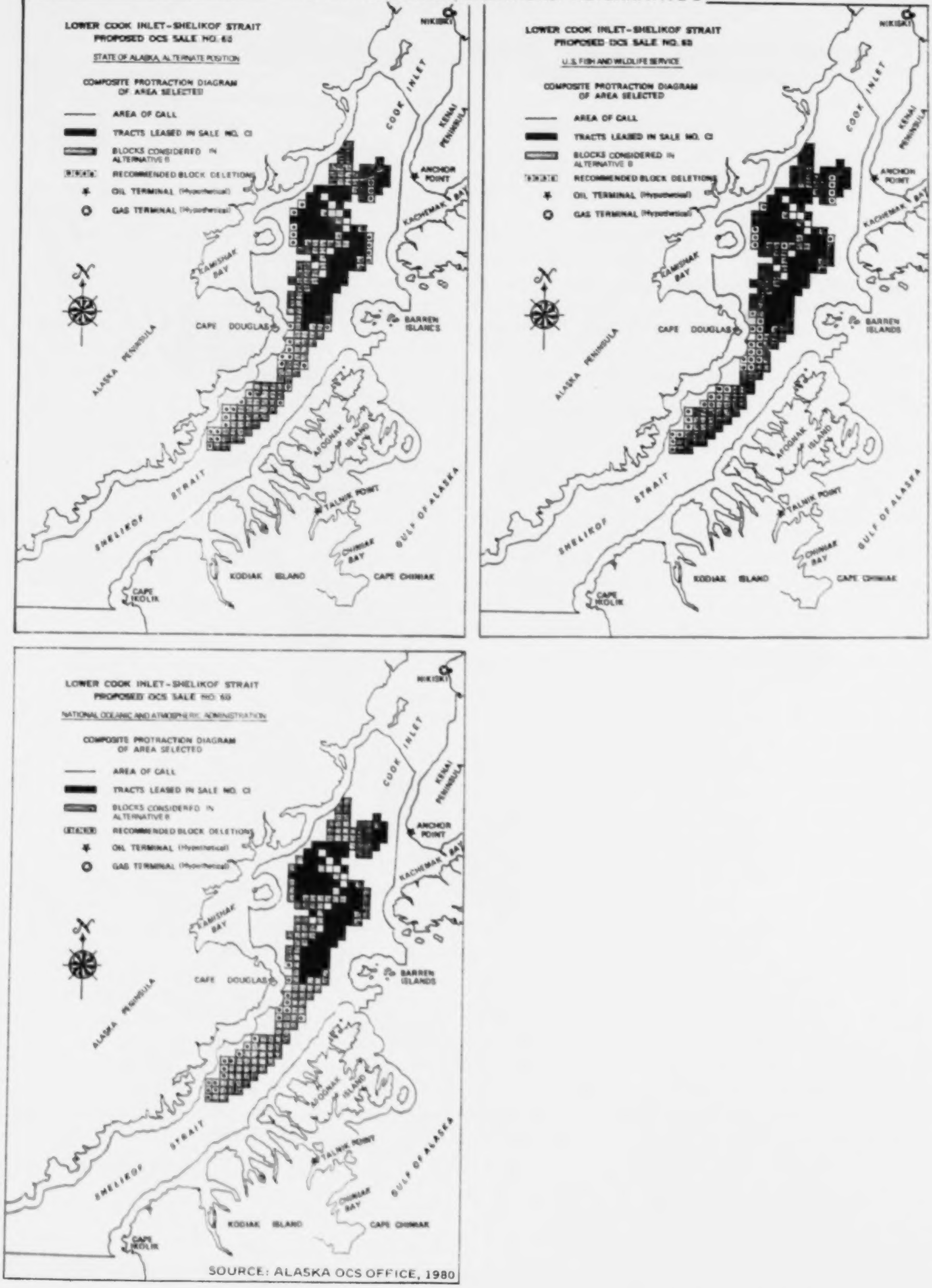
Conclusion: The impacts from block deletion alternative A should be substantially the same as assessed in alternative IV.

Cumulative Effects: The cumulative effects of block deletion alternative A should be moderately increased for the marine and avian resources and habitat associated with Anchor Point and Kamishak Bay, as assessed in alternative IV, due to the addition of the northerly blocks of the proposed lease sale area.

2. Block Deletion Alternative B: This alternative involves modification of the proposed sale area by the deletion of 12 blocks within lower Cook Inlet and 32 blocks in Shelikof Strait, for a total deletion of 44 blocks. The alternative proposes the leasing of 49 blocks within Shelikof Strait, based on the definition of demarcation between lower Cook Inlet and Shelikof Strait as contained in alternative V, and the leasing of 60 blocks in lower Cook Inlet, for a total of 109 blocks. The alternative is based on the alternate proposal of the State of Alaska and the proposals of the U.S. Fish and Wildlife Service (FWS) and the National Oceanic and Atmospheric Administration (NOAA). For the purpose of this analysis, the alternative is discussed in terms of these recommendations and the justification submitted for modifying the proposed sale area. The recommendations are shown on figure IV.B.2.-1; the alternative is shown on figure IV.B.2.-2. The block deletion proposals are grouped because of similarity in the number or pattern of recommended

Figure IV.B.2.–1

BLOCK DELETION RECOMMENDATIONS: ALTERNATIVE B


LOWER COOK INLET–SHELIKOF STRAIT
PROPOSED OCS SALE NO. 60
STATE OF ALASKA, ALTERNATE POSITION
U.S. FISH AND WILDLIFE SERVICE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
COMPOSITE PROTRACTION DIAGRAM OF AREA SELECTED
AREA OF CALL
TRACTS LEASED IN SALE NO. CI
BLOCKS CONSIDERED IN ALTERNATIVE B
RECOMMENDED BLOCK DELETIONS
OIL TERMINAL (Hypothetical)
GAS TERMINAL (Hypothetical)
NIKISKI
COOK INLET
KENAI PENINSULA
ANCHOR POINT
KACHEMAK BAY
KAMISHAK BAY
CAPE DOUGLAS
BARREN ISLANDS
ALASKA PENINSULA
AFOGNAK ISLAND
SHELIKOF STRAIT
TALNIK POINT
GULF OF ALASKA
CHINIAK BAY
KODIAK ISLAND
CAPE CHINIAK
CAPE IKOLIK

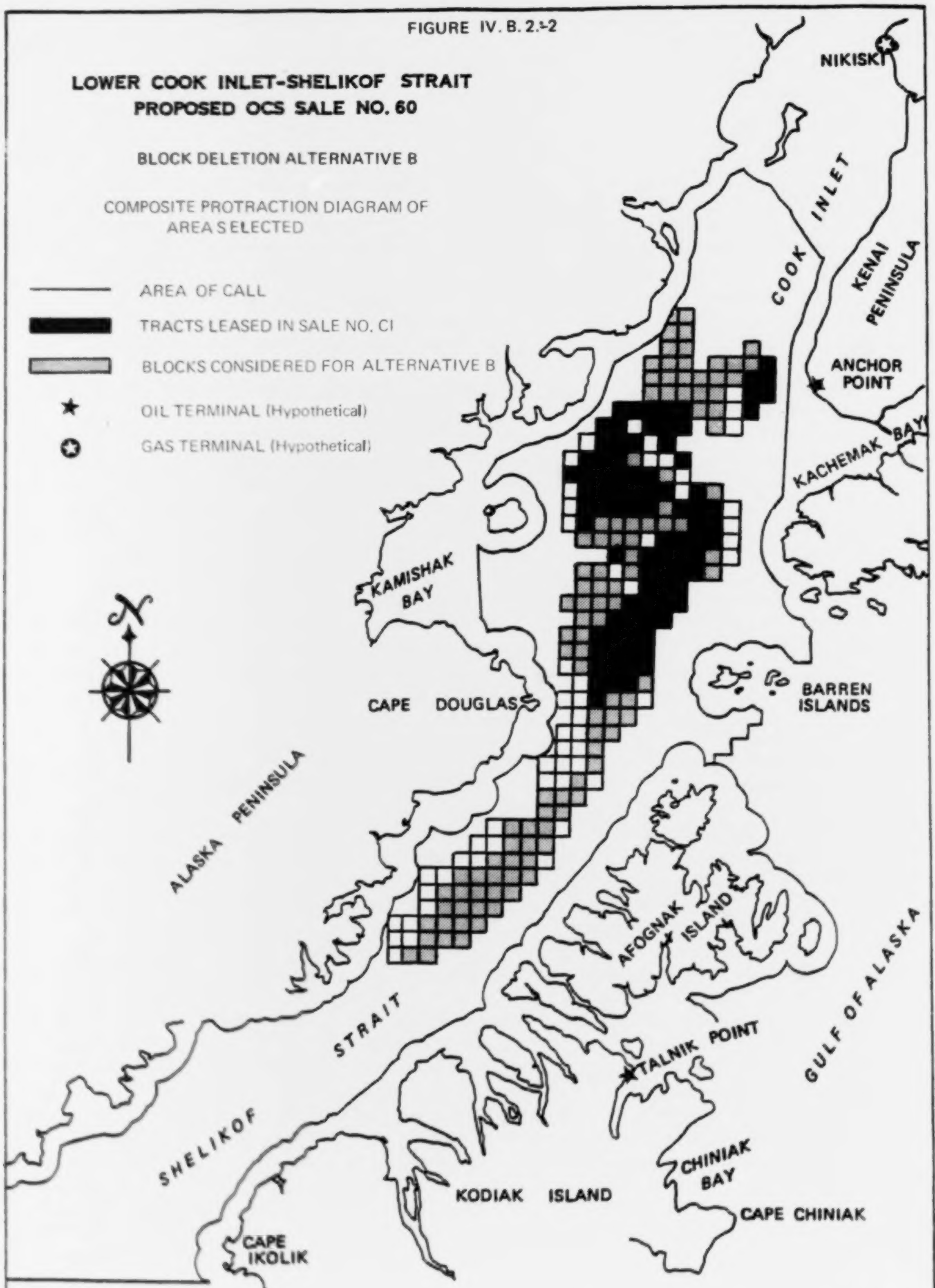
SOURCE: ALASKA OCS OFFICE, 1980

FIGURE IV. B. 2.-2

LOWER COOK INLET-SHELIKOF STRAIT
PROPOSED OCS SALE NO. 60

BLOCK DELETION ALTERNATIVE B

COMPOSITE PROTRACTION DIAGRAM OF AREA SELECTED


AREA OF CALL
TRACTS LEASED IN SALE NO. CI
BLOCKS CONSIDERED FOR ALTERNATIVE B
★ OIL TERMINAL (Hypothetical)
✪ GAS TERMINAL (Hypothetical)
N
NIKISKI
COOK INLET
KENAI PENINSULA
ANCHOR POINT
KACHEMAK BAY
KAMISHAK BAY
CAPE DOUGLAS
BARREN ISLANDS
ALASKA PENINSULA
AFOGNAK ISLAND
GULF OF ALASKA
SHELIKOF STRAIT
TALNIK POINT
CHINIAK BAY
CAPE CHINIAK
KODIAK ISLAND
CAPE IKOLIK

Source: Alaska Outer Continental Shelf Office 1980

deletions in lower Cook Inlet and/or Shelikof Strait. The number of blocks recommended for deletion are as follows:

	Shelikof Strait	Lower Cook Inlet	Total
State of Alaska	21	12	33
Fish and Wildlife Service	27	10	37
National Oceanic and Atmospheric Administration	20	0	20

The alternate proposal of the State is submitted should the Secretary consider leasing within the entire lease sale area as opposed to choosing an area which deletes the Shelikof Strait. The block deletion proposal by the State in lower Cook Inlet is identical to that described in block deletion alternative A, with the same justification. The pattern of these block deletions are comparable in the main with the block deletion recommendations of FWS in lower Cook Inlet, except that fewer blocks are included for deletion off Kachemak Bay. Within Shelikof Strait, the State, FWS, and NOAA seek a buffer between potential oil and gas activities and shore areas supporting concentrations of biota. The block deletion proposal by FWS is exclusively on the west side of Shelikof Strait, comprising a 6-nautical-mile buffer zone. Justification provided by the FWS is for the protection of seals and sea lions at six specific points along the coast between Cape Gull and Cape Douglas. The State recommends a similar but less extensive buffer in this area of the strait, as well as the deletion of four noncontiguous blocks on the east side as a buffer zone against oilspill threat. NOAA also recommends a buffer of block deletions on the west side of Shelikof Strait as well as the deletion of one block in the northeast part of the strait. The alternative contains the recommendation of the FWS for a 6-nautical-mile buffer zone on the west side of Shelikof Strait, within which are included in the recommendations by the other sources.

Environmental Impacts: The potential environmental impacts of block deletions in lower Cook Inlet are as described in block deletion alternative A. Within Shelikof Strait the impacts of alternative B were assessed as part of a larger set of block deletions contained in alternatives IV and V. As a discrete set, deletion of the nearshore blocks on the west side of Shelikof Strait could reduce to a limited extent the impacts to marine and coastal biota and habitats of western Shelikof Strait as compared to those assessed in alternatives I and VI. Impact reduction primarily would be associated with proportionate increases in spill weathering, dispersion, and response time as a function of increased transport distance to shore. Over the life of the field, the effects of incremental block deletions may be speculative as to the potential reduction of biological effects on Shelikof Strait resources as compared with alternatives I and VI. Although noise and other disturbance effects have a relationship to proximity, there is no evidence the deletion of specific blocks will afford increased protection from oilspill effects to specific island and cape habitats. The tidal action within the Strait is characterized by a net southwest flow and consequent net downstream dispersion over time rather than a direct, shortest distance flow from offshore to onshore sites. The impacts to marine resources and habitat may be reduced on the west side of Shelikof Strait as a function of delayed risk from oilspill effects, but such impacts should be little different from those assessed in alternatives I and VI over the life of the project.

Conclusion: The impacts from block deletion alternative B should be substantially the same in lower Cook Inlet as assessed in alternatives IV and V. The impacts from an additional 3-mile deletion in Shelikof Strait should be substantially the same as assessed in alternatives I and VI.

Cumulative Effects: The cumulative effects of block deletion alternative B should be substantially the same in lower Cook Inlet as assessed in alternatives IV and V. The impacts from an additional 3-mile deletion in Shelikof Strait should be substantially the same as assessed in alternatives I and VI.

3. Block Deletion Alternative C: This alternative involves modification of the proposed sale area by the deletion of 34 blocks on the west side of lower Cook Inlet, based on the definition of demarcation between lower Cook Inlet and Shelikof Strait contained in alternative IV. The alternative proposes the leasing of 53 blocks in lower Cook Inlet and 66 blocks in Shelikof Strait, for a total of 119 blocks. This alternative is based on the recommendations of Mr. Hank Pennington, representing the Kodiak Island Borough OCS Advisory Council; Mr. Bob Tremain, representing Cook Inlet crab fishermen; the State of Alaska, as an alternative to a seasonal drilling stipulation for a specific part of the lease sale area; and Mr. Paul Lowe, Chair, Alaska Chapter of the Sierra Club. For the purpose of this analysis, the alternative is discussed in terms of these recommendations and the justification submitted for modifying the proposed sale area. These recommended block deletions are shown on figure IV.B.3.-1; the alternative is shown on figure IV.B.3.-2. The proposals are grouped because they represent variations in block deletion configurations based on potential conflicts within a stationary crab fishery or coincidently derive a comparable pattern. Two of the proposals also recommend deletion of the entire Shelikof Strait. This is not included in the alternative as a result of being analyzed earlier. Block deletions in the respective recommendations are as follows:

	Shelikof Strait	Lower Cook Inlet	Total
State of Alaska	0	18	18
Cook Inlet Crab Fishermen	0	34	34
Kodiak Island Borough OCS Advisory Council	(1)	(1)	104
Alaska Chapter, Sierra Club	72	35	107

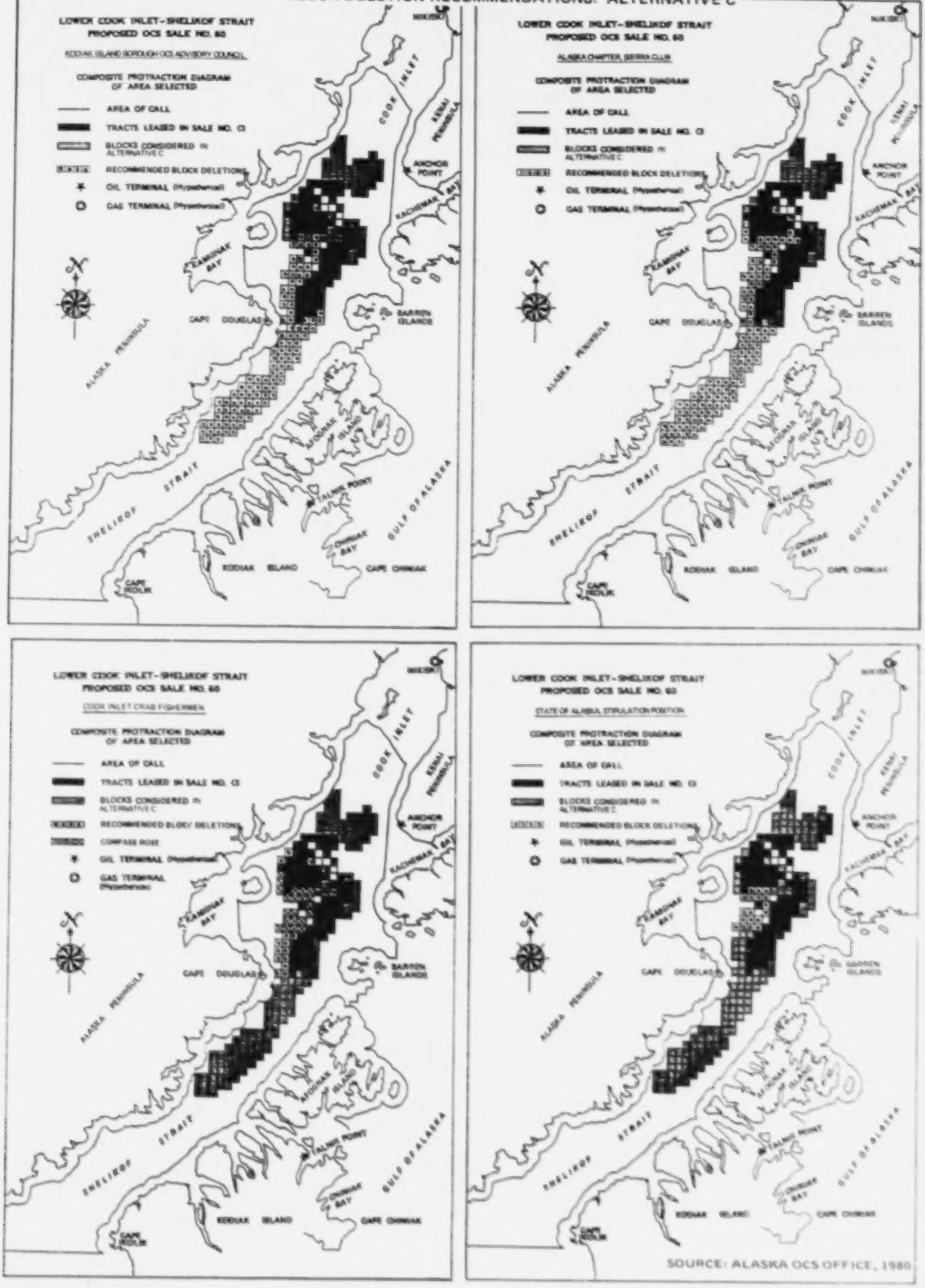
(1) Demarcation not specified

Block deletions are justified by the same type of reasons described in block deletion alternative A to support all block deletions recommended by the Sierra Club and the Kodiak Island Borough OCS Advisory Council. The potential gear conflict problem with the stationary pot fishery was singled out by the State and the Cook Inlet crab fishermen as the sole source of justification for block deletions on the west side of lower Cook Inlet, the State recommendation being a subset of the blocks recommended by the fishermen. The State recommendation is essentially what the fishermen term the "Compass Rose," an area of crab breeding, rearing, and fishing. The larger set of blocks submitted by the fishermen included the "Compass Rose" as well as crab migration routes, all essential areas of harvest supporting the Cook Inlet crab fishery.

Environmental Impacts: Within lower Cook Inlet, the impacts of alternative C were assessed as part of a larger set of block deletions contained in alterna-

Figure IV.B.3.–1

BLOCK DELETION RECOMMENDATIONS: ALTERNATIVE C


LOWER COOK INLET–SHELIKOF STRAIT
PROPOSED OCS SALE NO. 60
KODIAK ISLAND BOROUGH OCS ADVISORY COUNCIL
COMPOSITE PROTRACTION DIAGRAM OF AREA SELECTED
AREA OF CALL
TRACTS LEASED IN SALE NO. CI
BLOCKS CONSIDERED IN ALTERNATIVE C
RECOMMENDED BLOCK DELETIONS
OIL TERMINAL (Hypothetical)
GAS TERMINAL (Hypothetical)
NIKISKI
COOK INLET
KENAI PENINSULA
ANCHOR POINT
KACHEMAK BAY
KAMISHAK BAY
CAPE DOUGLAS
BARREN ISLANDS
ALASKA PENINSULA
AFOGNAK ISLAND
SHELIKOF STRAIT
TALNIK POINT
GULF OF ALASKA
CHINIAK BAY
KODIAK ISLAND
CAPE CHINIAK
CAPE IKOLIK
LOWER COOK INLET–SHELIKOF STRAIT
PROPOSED OCS SALE NO. 60
ALASKA CHAPTER, SIERRA CLUB
COMPOSITE PROTRACTION DIAGRAM OF AREA SELECTED
AREA OF CALL
TRACTS LEASED IN SALE NO. CI
BLOCKS CONSIDERED IN ALTERNATIVE C
RECOMMENDED BLOCK DELETIONS
OIL TERMINAL (Hypothetical)
GAS TERMINAL (Hypothetical)
LOWER COOK INLET–SHELIKOF STRAIT
PROPOSED OCS SALE NO. 60
COOK INLET CRAB FISHERMEN
COMPOSITE PROTRACTION DIAGRAM OF AREA SELECTED
AREA OF CALL
TRACTS LEASED IN SALE NO. CI
BLOCKS CONSIDERED IN ALTERNATIVE C
RECOMMENDED BLOCK DELETIONS
COMPASS ROSE
OIL TERMINAL (Hypothetical)
GAS TERMINAL (Hypothetical)
LOWER COOK INLET–SHELIKOF STRAIT
PROPOSED OCS SALE NO. 60
STATE OF ALASKA, STIPULATION POSITION
COMPOSITE PROTRACTION DIAGRAM OF AREA SELECTED
AREA OF CALL
TRACTS LEASED IN SALE NO. CI
BLOCKS CONSIDERED IN ALTERNATIVE C
RECOMMENDED BLOCK DELETIONS
OIL TERMINAL (Hypothetical)
GAS TERMINAL (Hypothetical)

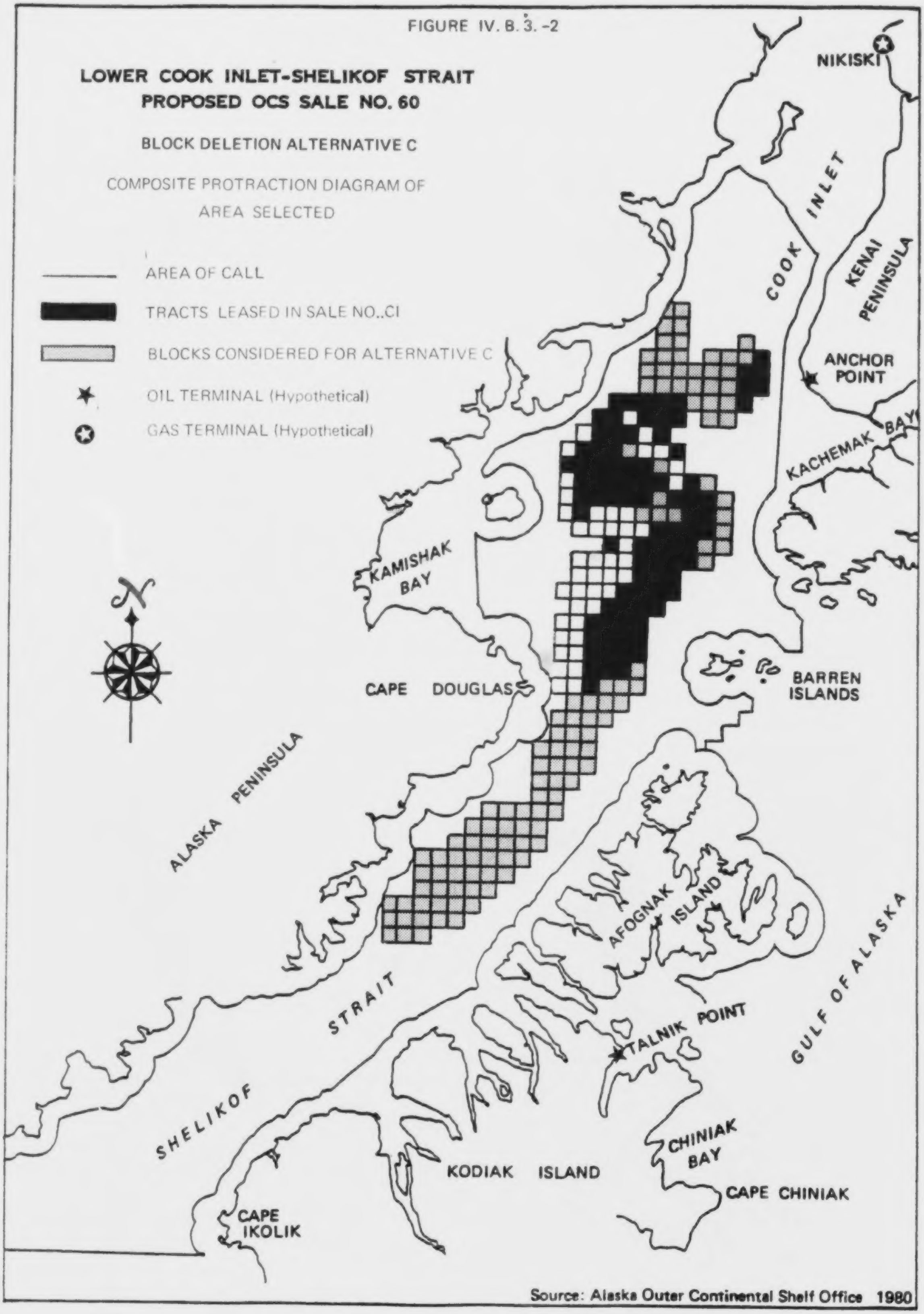
SOURCE: ALASKA OCS OFFICE, 1980

FIGURE IV. B. 3. -2

LOWER COOK INLET-SHELIKOF STRAIT
PROPOSED OCS SALE NO. 60

BLOCK DELETION ALTERNATIVE C

COMPOSITE PROTRACTION DIAGRAM OF
AREA SELECTED


AREA OF CALL
TRACTS LEASED IN SALE NO. CI
BLOCKS CONSIDERED FOR ALTERNATIVE C
OIL TERMINAL (Hypothetical)
GAS TERMINAL (Hypothetical)
N
NIKISKI
COOK INLET
KENAI PENINSULA
ANCHOR POINT
KACHEMAK BAY
KAMISHAK BAY
CAPE DOUGLAS
BARREN ISLANDS
ALASKA PENINSULA
AFOGNAK ISLAND
GULF OF ALASKA
SHELIKOF STRAIT
TALNIK POINT
CHINIAK BAY
CAPE CHINIAK
KODIAK ISLAND
CAPE IKOLIK

Source: Alaska Outer Continental Shelf Office 1980

tive VI. As a discrete set, deletion of a substantial number of blocks on the west side of lower Cook Inlet could significantly reduce impacts to marine resources and habitats in Kamishak Bay and elsewhere on the west side of Cook Inlet through reduction in risk from oilspills, as well as produce a moderate reduction in risk to marine and coastal birds, based on limited existing information. However, in terms of the justification for block deletions, none of the analysis performed for the crab fisheries showed any major gear conflicts over the life of the field. Consequently, the potential for gear conflict is not expected to be realized.

Conclusion: The impacts from the deletion of the blocks on the west side of lower Cook Inlet should be significantly less for the marine resources in this part of Cook Inlet than the impacts assessed in alternatives I, IV, and V. However, based on the justification for block deletion, the impacts on the stationary crab fishery in lower Cook Inlet should be substantially the same as assessed in alternatives I, IV, and V.

Cumulative Effects: Deletion of the blocks on the west side of lower Cook Inlet should substantially reduce the cumulative effects from oilspill risk on the west side of Cook Inlet as assessed in alternatives I, IV, and V. However, based on the justification for these block deletions, the cumulative effects should be substantially the same as assessed for the west side of lower Cook Inlet under alternatives I, IV, and V.

C. Relationship Between Local Short-term Uses and Maintenance and Enhancement of Long-term Productivity

In this section, the short-term effects and uses of various components of the environment of the lower Cook Inlet/ Shelikof Strait areas are related to long-term effects and the maintenance and enhancement of long-term productivity. The effects of the proposed action would vary in kind, intensity, and duration, beginning with preparatory activities (seismic data collection and exploration drilling) of oil and gas development, and ending when natural environmental balances might be restored.

In general, "short-term" refers to the useful lifetime of the proposal, but some even "shorter-term" uses and effects are considered. "Long-term" refers to that time beyond the lifetime of the proposal. The life of any oil and gas development in the lower Cook Inlet/Shelikof Strait has been estimated to be about 26 years. In other words, short-term refers to the total duration of oil and gas exploration and production, whereas long-term refers to an indefinite period beyond the termination of oil and gas production. This period will vary from one environmental component to another.

Many of the impacts discussed in sec. IV are considered to be short-term (being greatest during the construction, exploration, and early production phases), which could be further reduced by the mitigating measures discussed in section II.

Biological productivity would be lost in the short-term on all onshore lands used in the proposed project. These areas could be returned to productivity in the long-term with proper management. Restoration may not be entirely feasible; however, the overall loss would be a minor adverse effect. The direct land requirements, as shown in the development scenario, would show in both the short-term and the long-term because of disturbance. Some species may have difficulty repopulating and could be displaced.

Short-term oil pollution and the possibility of long-term cumulative oil pollution impacts could cause serious adverse effects on all components of the marine ecosystem, including fisheries. While restoration would allow fisheries production to regain original levels, any reduced annual harvests during the life of the project would be irretrievably lost. The extent is not known presently, but the potential must be recognized.

Freshwater pollution from onshore activities is a short-term effect. The long-term decrease in water quality may be considered to be a tradeoff for obtaining oil and gas resources.

The biota would be threatended in the short-term by potential oil pollution. Direct mortality could be significant through the combined effects of harassment by humans and increased volume and frequency of noise from vessel traffic or overflying aircraft. In the long-term, such disturbances could alter behavior patterns and could drive fauna away from traditional feeding and breeding grounds or to other critical areas within their range reducing species populations over a long period of time.

Habitat destruction could cause a reduction in subsistence species, such as salmon. This could threaten the regional economy. The improved accessibility to primitive areas from increased construction is a short-term result from this proposal. This overall wilderness value of the coast may decrease from increased land use. Increased human populations in the short-term could change the regional Native culture in the long-term. The subsistence way of life could be modified and population shifts could occur. The overal changes cannot be termed positive or negative, except by those affected.

Archeologic and historic values discovered during development would enhance long-term knowledge. Overall finds may help to locate other sites, but, destrucion of artifacts would represent long-term losses.

Consumption of offshore oil and gas would be a long-term use of nonrenewable resources. Economic, political, and social benefits may accrue from the availability of oil and gas. Most benefits would be short-term and would decrease the nation's dependency on oil imports. If additional supplies were discovered and developed, the proposed production system would enhance extraction.

The production of oil and gas from the Cook Inlet/Shelikof Strait would provide short-term, critically needed energy and perhaps provide time either for the development of long-term alternative energy sources or substitutes for petroleum feedstocks. Petroleum development in these areas may mean the irreplaceable loss of some fisheries production. The maintenance and enhancement of long-term productivity will depend on efforts to control water-quality levels. Regional planning will aid in controlling changing economics and populations, and thus in moderating any adverse impacts.

Alternatives to the proposal, such as cancellation, delay, and partial deletion options reduce to varying degrees both the long- and short-term environmental effects, as well as the long- and short-term energy supply benefits, as explained in the preceeding impact sections.

D. Irreversible and Irretrievable Commitment of Resources

1. Mineral Resources: The mean resource estimates of the proposed action are 670 MMbbls of oil and 1.173 tcf of natural gas. Should these resources be discovered, they will be irretrievably consumed.

2. Biological Resources: Commercial fishery losses may occur in several ways as discussed in section IV.A.2.b. and c. (Impacts on Commercial Fish and Commercial Fishing). For example, if the nearshore areas are contaminated salmon and herring may avoid the areas which are also the areas in which they are harvested. If fish tissue of any species becomes tainted, there may be a widespread consumer avoidance of all locally harvested fish products, which would affect both fishermen and processors alike. Any losses of commercial fishing incomes attributable to this proposal would be irreversible and irretrievable. Unharvested commercial finfish and shellfish, as renewable resources, would be irretrievably lost to the economy.

If there is competition for harbor space or employees as a result of leasing, U.S. fishermen may not aggressively exploit the U.S. offshore bottomfishery potentials. Continued harvest of bottomfish by foreigners means irretrievably lost income to U.S. fishermen and processors.

General industry activities, such as increased ship traffic, aircraft noise, and land based activities, could displace marine and terrestrial birds and mammals into less favorable environments, which would eventually result in reduced population levels. This displacement could become irretrievable if permanent alterations to the environment and habitat were maintained by man.

3. Endangered Species: Under the proposal, it is possible that endangered whales could be subjected to irreversible direct and indirect effects of oilspills, disturbance due to noise and other human activities, or losses and/or deterioration of habitat due to facility developments. Whether such effects would lead to permanent (irreversible) losses of whale resources is unknown (see sec. IV.A.2.f., Unavoidable Adverse Effects Resulting from the Proposal).

4. Social Factors: Irreversible and irretrievable lifestyle elements could be lost if Kodiak Island and Cook Inlet villages are changed without consideration by industry of their traditional values and social interrelationships. These aspects of village life have evolved over centuries of living a subsistence-oriented lifestyle which could be affected through external economic stimulus. Irretrievable loss of customary and traditional renewable resources could significantly damage the social and economic fabric of village life. The city of Port Lions may lose its close-knit, small fishing community quality and sociocultural character if consideration is not given to the impact of people from large metropolitan and industrial communities. An irretrievable loss of lifestyle and quality of life also may be experienced in Kodiak and Homer, larger communities capable of a higher degree of adaptation but which maintain aspects of village lifestyle.

5. Visual and Wilderness Resources: With the proposal, there would be an irreversible commitment of wilderness and scenic resource areas in certain coastal locations of the Kodiak Archipelago and Kenai Peninsula.

E. Worst Case Analysis

1. Endangered Species: To develop an ability to predict (with reasonable statistical confidence) the behavioral responses of a relatively common endangered whale species to all sources of noise associated with petroleum exploration, development, and production would require extensive field experiments for which it is uncertain (and unlikely) that control of all relevant variables could be achieved. To achieve ability to predict behavioral response patterns of very rare whale species (such as the right whale, which has not been sighted in the proposed sale area in recent years) through experimental or purely descriptive approaches is impossible given the present state of the art and probably will remain so for the foreseeable future. The same rationale could be applied with equal validity to describe the difficulty of predicting direct physiological response of endangered whales to effects of oilspills. Therefore, it has been determined that information on certain endangered whale responses to effects of OCS development and production is important to the decisions addressed herein and the means to obtain such information is not presently known. A worst case analysis is presented below in order to facilitate a reasoned choice among the various alternatives. Sufficient information exists to predict with confidence that the proposed sale will have little, if any, detrimental effects on endangered birds.

The worst case analysis for endangered whales draws from certain subjective judgments and assumptions regarding whale responses for which the validity has not been statistically tested or verified. It also is based on assumptions regarding exploration, development, and production activities of petroleum resources in the proposed sale area (sec. IV.A.1.). As indicated by the oilspill risk analysis, should spills occur, they would be confined usually to the lower Cook Inlet and Shelikof Strait area. Therefore, portions of this analysis will be confined primarily to oilspill effects which would be generally restricted to this area. Also, based on existing information (sec. III.B.5.) and graphic 12), it is highly unlikely that sperm or blue whale populations or individuals make significant use of lower Cook Inlet or Shelikof Strait. On the other hand, recent sightings of gray, fin, humpback, and sei whales in or near the proposed sale 60 area mandate that these species be considered in a worst case analysis. The right whale also is considered in this analysis since historical records indicate a previous, although not recently confirmed, utilization of waters east of Kodiak Island. In addition, there is not sufficient knowledge of the present status of the right whale to positively exclude the possibility that a critical portion of the remaining right whale population may occasionally frequent the proposed sale area.

Table IV.E.-1 shows a list of assumptions referenced for the purpose of this analysis. The probability of the assumptions being correct are also indicated. Since the whale species considered herein are similar to the extent that all are baleen whales, they are treated in general unless otherwise specified. Table IV.E.-2 presents assumptions regarding exploration, development, and production effects hypothesized for this analysis.

No clear definition of a "worst case" exists and, therefore, at least two approaches can be employed to make such an analysis. One approach would be to speculate on the most likely undesirable consequences given a set of postulates (i.e., an answer to the question, "What are the most likely undesirable consequences that will happen given certain conditions?"). The second approach

Table IV.E.-1
Assumptions Made Regarding Endangered Whale Status and Response

	Assumption	Probability of Assumption Being Correct[1/]
1.	Although listed in the endangered species, the gray whale population is close to pre-whaling stock size and may be near the capacity of its range.	High
2.	Humpback, fin, sei, and right whales population are substantially below pre-whaling stock size.	High
3.	Gray, humpback, fin, and sei whales are found in or near the proposed sale area during spring, summer, and fall.	High
4.	Right whales occur in or near the proposed sale at least during the summer.	Unknown
5.	Fouling of baleen by crude oil could temporarily reduce whale feeding efficiency.	Moderate
6.	Localized food sources of endangered whales could be reduced, at least temporarily, by toxic hydrocarbons.	Low-Moderate
7.	Endangered whale behavior in the presence of spilled hydrocarbons would permit contact with such pollutants.	Moderate
8.	Direct cutaneous contact with or inhalation of volatile compounds associated with crude oil or other spilled hydrocarbons could affect whales at least temporarily.	Moderate
9.	Direct cutaneous contact with or inhalation of volatile compounds associated with crude oil or other spilled hydrocarbons could kill endangered whales directly.	Unknown
10.	Long-term use of oil-polluted areas would lead to tissue accumulation of toxic substances and deleterious effects on endangered whales.	Unknown
11.	Endangered whales are or will be sensitive to drilling noise or other sources of disturbance associated with oil and gas exploration, development, and production phases.	Unknown

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[1/] Low: Less than a 50 percent chance of assumption being correct. Moderate: 50 percent chance of assumption being correct. High: Greater than a 50 percent chance of assumption being correct. (In the judgment of the analyst, based on available data.)

Table IV.E.-2
Postulate for Level of Perturbations Associated with the Proposed Sale 60 Which May Affect Endangered Whales

	Assumption	Probability of Assumptions Being Correct[4/]
1.	The proposed lease sale will be held and exploration[1] of the proposed sale area will be initiated.	Moderate-High
2.	Sufficient petroleum resources are discovered to warrant development[2] of the proposed sale to production phases.[3]	Low[5] (5%)
3.	If production phases are realized, at least 4 spills greater than 1,000 bbl will occur over the life of the field.	High[6] (98%)
4.	If exploration or production phases are realized at least one catastrophic spill consisting of a blowout of 2,000 bbl per day for 30 days will occur.	Low
5.	If spills occur, at least one or all the spills will escape containment and thus spill behavior will be controlled strictly by natural influences such as winds, currents, and tides.	Moderate-High

---

1/, 2/, and 3/ See section IV.A.1. for additional assumptions regarding causes of possible impacts.

4/ Low: Less than a 50 percent chance of assumption being correct. Moderate: 50 percent chance of assumption being correct. High: Greater than a 50 percent chance of assumption being correct.

5/ See section II.A.

6/ Appendix D.

would be to assign a probability of occurrence to a specifically defined consequence (i.e., an answer to the question, "What is a probability of a specifically defined 'worst case'?"). Both approaches are employed herein.

Most Likely Undesirable Consequences

Table IV.E.-1. and IV.E.-2 consist of a set of postulates which can be used to speculate on the most probable undesirable consequences of the proposed sale. Table IV.E.-2 shows that there is a moderate to high chance that exploration activities will occur, and; given such activities, a low probability that development phases will be achieved. Nevertheless, this analysis will assume the occurrence of exploration, development, and production of the proposed sale, and speculate on the most likely undesirable consequences regarding endangered whales that may occur for each phase. Refer to section IV.A.2.f. for a description of possible direct and indirect effects of various perturbations which may impact whales, and sections IV.A.1.a. through IV.A.1.c. for detailed assumptions regarding each phase of the proposed sale.

Exploration: The most likely of potential undesirable outcomes which would occur as a result of direct effects of exploration activities would be temporary disturbance on localized basis of whales which may feed or migrate in or near exploration platforms or transportation routes used to access platforms. In consideration of the relatively small number of platforms, and already substantial boat traffic in lower Cook Inlet and Shelikof Strait, it seems unreasonable to envision disturbance due to exploration activities as being of major additional consequence to endangered whale populations. In the event of marine pollution, (e.g., oilspills, drilling mud and cutting disposal, other wastes) during exploration, the entire range of direct and indirect effects discussed in section IV.A.2.f. of such pollution may occur and the magnitude of such effects may be in direct proportion to the magnitude of the pollution and/or the number of whales present and potentially affected by it. Numbers of whales affected will vary in terms of seasonal use patterns (e.g., relatively little direct effects in winter for all species, but perhaps more during spring, summer, and fall) and population responses may vary proportionate to the fraction of any particular population present. It would be very unlikely that the amount of drilling muds and cuttings disposed at sea during exploration would significantly impact cetaceans given the small amount and probable extreme dilutions that would be achieved by any toxic fraction. Therefore, since lower Cook Inlet and Shelikof Strait are not presently known to be areas of major importance to any endangered whale species (see section IV.B.5.), it is unlikely that the exploration phase would result in major undesirable responses (e.g., increased mortality rate, decreased productivity, habitat abandonment) of endangered cetaceans. This conclusion was also reached by National Marine Fisheries Service in consultation with the Bureau of Land Management (appendix H).

Development: The most likely of potential undesirable consequences affecting endangered whales during development would be effects of disturbance since the maximum potential for disturbance of endangered whales would probably occur during this phase. Such disturbance could result in at least temporary and possibly long term abandonment of habitats in the vicinity of platforms, pipelines, or facility construction nearshore. Drilling noise during the development phase, vessel noise, noise of construction, etc., could all affect whales during the 5-year development period. Temporary response of whales to peak transportation activity between shore and offshore support/supply bases or platforms may occur. Such temporary or development phase effects would not be expected to be particularly pronounced for gray whales since there is evidence that they are relatively tolerant of human activity. Whether any other endangered population is particularly sensitive to such disturbance and would be adversely affected during the development phase is unknown.

In the event of marine pollution (e.g., oilspills, drilling mud and cuttings disposal, other wastes) during development, the entire range of direct and indirect effects discussed in section IV.A.2.f. may occur, and the magnitude of such effects may be in direct proportion to the magnitude of the pollution and number of whales present and potentially affected. Probably of most significance would be cetacean habitat alteration associated with drill cutting disposal. This may cause temporary reduction of benthic organisms utilized by gray whales, but since most of the gray whale population feeds at more northern latitudes, no major impact on this species would be expected. It is unlikely that the physical presence of cuttings would affect other endangered whale species. It is unknown whether toxic substances introduced into the marine environment as a result of development would affect whales. However, since lower Cook Inlet and Shelikof Strait are not presently known to be areas of major importance to any endangered whale species (sec. III.B.5.), it is unlikely that the development phase would result in major undesirable population responses of endangered cetaceans. As mentioned above, temporary or long term abandonment by endangered cetaceans of certain locales, such as near platforms or transportation facilities, could occur.

Production Phases: One of the most likely of potential undesirable consequences of production phases would be effects on whales associated with repeated or chronic introduction of pollutants into the marine environment. Refer to sections IV.A.2.f. through IV.A.7.f. for detailed analysis of potential oilspill-related effects on endangered cetaceans as may be associated with the proposal or its alternatives. In the event of marine pollution (e.g., oilspills, drilling mud and cuttings disposal, other wastes) during production, the entire range of direct and indirect effects discussed in section IV.A.2.f. may occur in direct proportion to the magnitude of the pollution and number of whales present and potentially affected by it. Therefore, since so little is known about the specific mechanisms or magnitude of the response of the whales to various direct or indirect effects to oilspills or other marine pollution, no quantitative assessment of potential endangered whale population response can be made at this time. However, such effects are possible. As concluded previously, spills occurring over the production life of the field would be highly likely in the vicinity of the northern Kodiak Archipelago, Kamishak Bay, and eastern Shelikof Strait. These risks could possibly lead to lowered carrying capacity of these areas for endangered whales or possibly to long term ingestion and accumulation of toxic substances encountered in such areas. Also to be associated with production phases would be disturbance and spill effects associated with tankering and petroleum products. Movement of tankers though Stevenson or Kennedy Entrance may not result in risks of oilspills above those already existing but movement of tankers from a location on eastern Kodiak Island over the Portlock Banks could expose what are probably important cetacean feeding areas to risks not presently existing. Portlock Bank areas east of Kodiak Island are probably more significant than areas inside lower Cook Inlet and Shelikof Strait in terms of whale use and potential food availability to whales. Travel of tankers throughout the range of various species may affect whales over a larger region than those activities on the sale area proper. However, it is difficult, if not impossible, at this time to evaluate potential effects of pollution or disturbance due to the proposed sale or to compare such effects to those already sustained from other sources.

Since most construction and development drilling would have been completed prior to this phase, disturbance effects due to drilling, if existant, would be of lesser significance than during the development phase.

Probability of Defined Worst Case

Two major "worst case" situations are postulated and the probabilty of such "worst cases" estimated. These cases were selected because it was the viewpoint of Bureau of Land Management that whale mortality or habitat loss may be the two consequences of the proposed project which could be causally or directly linked to any observable population response in endangered cetaceans, and which may be of most significance of all possible consequences.

Mortality of a Critical Number: An event which would be a major concern in terms of a threat to the survival of an endangered cetacean species and, therefore, one which would be considered a "worst case" would be one which caused direct mortality of a critical number of animals. Mortality of a "critical number" could be considered an amount of mortality which exceeded a level from which the population could recover. Such an event could, therefore, be implicated as a proximal cause of the extinction of a species and reasonably be classified as a "worst case" event. Table IV.E.-1 shows that the probabilities of an individual whale being killed as a result of direct contact with spilled oil is "unknown" (table IV.E.-1). However, if it is assumed that 1) this latter probability is high, 2) a major portion or critical number of an endangered whale population is present at the time of spill occurrence in the area of occurrence, and 3) that assumption 2 or 4 (table IV.E.-2) are low, then it must be concluded that the joint probability of (1), (2), and (3) above is also low. Therefore, it is unlikely that the proposed lease sale would cause a "worst case" threat to endangered whale populations as a result of direct mortality.

Abandonment of Habitat: Another "worst case" situation which could be envisioned for endangered whales would be the possibility of the exclusion of these species from previous habitats as a direct result of noise and other disturbance. As shown in table IV.E.-1 (assumption 8), it is unknown if the various endangered whale species under consideration are sensitive to disturbance associated with oil and gas development and production. In general, each species and each potential source of disturbance would have to be studied on a case-by-case basis before accurate sensitivity assessments could be made. However, if we 1) assume that these species are sensitive to most oil and gas related disturbance, and 2) assume that the probability of development and production of the field is as shown in table IV.E.-2, assumptions 1 and 2, then it appears that the probability of any long term effect of noise and other disturbance due to the proposed sale would be the joint probability of (1) and (2); i.e., of low to moderate probability at most. If oil and gas is discovered, then the probability of disturbance effects on whales may be higher, particularly on a local level and for species such as the humpback which may be sensitive to certain types of disturbance. The probability of such sensitivity leading to an undesirable population response is unknown and would vary on a species-by-species basis.

Conclusion:

Most Likely Undesirable Consequences: It is unlikely that the exploration phase for this proposed sale would result in major undesirable responses by endangered cetaceans. Temporary or long-term abandonment of certain locales, such as near platform or transportation facilities, could occur during development phases. Repeated or chronic pollution of the marine environment during the production phase may affect endangered cetaceans (bioaccumulation of toxic substances). It is difficult, if not impossible, to quantify the extent of effect of pollution associated with production phases on endangered cetaceans at this time (see section IV.E.).

Probability of Defined Worst Case: It is unlikely that the proposed lease sale would cause a "worst case" threat to endangered whale populations (i.e., direct mortality). The probability of long-term effects of noise and disturbance leading to habitat abandonment is low to moderate at most. If oil and gas are discovered, the probability of habitat abandonment by sensitive species due to noise and disturbance may be higher.

V. REVIEW AND ANALYSIS OF COMMENTS RECEIVED

Comments and testimony were received from a diverse group of individuals, groups, organizations, companies, and local, State, and Federal agencies. Comments ranged from support of the statement and the proposal to requests for major revisions of the statement and postponement or withdrawal of the proposal.

The latter portion of this section contains copies of correspondence received from Federal agencies, State and local governments and agencies, and other representative organizations and individuals that were felt to represent the major relevant concerns regarding the draft statement and the proposed action. A listing of persons testifying at the public hearing and a listing of those persons who submitted written comments are also included in the latter portion of this section.

All written and oral comments received were first reviewed relative to either corrections and editorial changes to the DEIS or issues raised. Where possible and appropriate, the DEIS has been revised to correct errors and omissions, and to clarify and/or augment discussions of issues of concern. All substantive issues were analyzed to determine which revisions were necessary to strengthen and improve upon the DEIS. The FEIS reflects, wherever possible, the consideration given to these issues.

The following pages contain a summary of the issues of major concern that were raised during the DEIS review process. For convenience they have been grouped in the following manner:

A. Block Deletion Recommendations
B. Mitigating Measures
C. Approach, Assumptions, and Methods Used
    1. Oilspill risk analysis
    2. Design of alternatives and development scenarios
    3. Environmental studies and data gaps
    4. Other procedural aspects
D. Environmental Impact Assessment
    1. Cumulative effects with proposed OCS sale 61
    2. Biological environment
    3. Physical environment
    4. Coastal zone management
    5. Air and water quality
    6. Worst case analysis
E. General Issues

A. Block Deletion Recommendations

Recommendations for block deletions were received from eight agencies, organizations, and individuals. These were grouped by similarity of deletion patterns into three block deletion alternatives for the purpose of analysis under section IV.B., analysis of other block deletion alternatives. The description and justification of each of the block deletion alternatives are contained in section IV.B. The respective recommendations for block deletions which were synthesized to form the block deletion alternatives are as follows:

Block Deletion Alternative A	Shelikof St.	Lower C.I.	Total
State of Alaska, Primary Position	68	12	80
Friends of the Earth	75	12	87
Kodiak Island Borough	81	0	81
Block Deletion Alternative B			
State of Alaska, Alternate Position	21	12	33
Fish and Wildlife Service	27	10	37
National Oceanic and Atmospheric Administration	20	0	20
Block Deletion Alternative C			
State of Alaska, Mitigation Position	0	18	18
Cook Inlet Crab Fishermen	0	34	34
Kodiak Island Borough OCS Advisory Council	-(1)	-(1)	104
Alaska Chapter, Sierra Club	72	35	107

The analysis of the alternatives synthesized from these recommendations was by necessity comparative in relation to the analysis performed for the proposal and the respective alternatives in the DEIS. Such analysis was lacking in specific resource estimates and oilspill trajectory analysis because of the time needed to carry out and coordinate such work. Although some block deletion recommendations were made prior to establishing the alternatives for DEIS analysis, it would have improved the analysis performed in the DEIS if as many configurations of block deletions as possible were brought forth and justified during the scoping process. A major emphasis during scoping had been the identification of block deletion proposals for analysis in the EIS. It would have improved the completeness of the analysis if the suggested block deletions had been known earlier in the process.

The block deletion alternatives represent specific significant issues which are responded to as follows:

Issue: Deletion of the blocks in Shelikof Strait was recommended by a number of commenters, although the demarcation between the strait and lower Cook Inlet differed somewhat in each case. Some concern also was expressed by several commenters for the deletion of a single tier of blocks in several parts of lower Cook Inlet. The addition of 19 northerly blocks of the lease sale area to alternative IV was recommended by one commenter, incorporating blocks which had been deleted to evaluate fisheries impact differentials.

Sources: State of Alaska, Friends of the Earth, Kodiak Island Borough OCS Advisory Council, Sierra Club.

Response: Block deletion alternative A incorporates a synthesis of these recommendations. The environmental impacts of the blocks subject to leasing in the alternative are discussed in section IV.B.1. The assessment concludes the impacts should be substantially the same as assessed in alternative IV, although the cumulative effects from adding the 19 northerly blocks should be moderately increased for the marine and avian resources and habitat associated with Anchor Point and Kamishak Bay.

Issue: Deletion of blocks on the west side of Shelikof Strait to form a 6-nautical mile buffer from shore was recommended by one commenter. Modifications of this concept were recommended by several others, incorporating the deletion of fewer blocks but for substantially the same reasons.

Sources: State of Alaska, Fish and Wildlife Service, National Oceanic and Atmospheric Administration.

Response: Block deletion alternative B incorporates the 6-nautical mile buffer from shore on the west side of Shelikof Strait, within which are included the other recommendations for similar block deletions. The environmental impacts of the blocks subject to leasing in the alternative are discussed in section IV.B.2. The assessment concludes that the impacts and cumulative effects from the alternative should be substantially the same in Shelikof Strait as assessed in alternatives I and VI.

Issue: Deletion of blocks on the west side of lower Cook Inlet was recommended by a number of commenters, several for the purpose of avoiding potential conflicts with a stationary crab fishery.

Sources: State of Alaska, Cook Inlet crab fishermen, Kodiak Island Borough OCS Advisory Council, Sierra Club.

Response: Block deletion alternative C incorporates the major block deletion on the west side of lower Cook Inlet recommended by the crab fishermen, within which are included the other recommendations for similar block deletions. The environmental impacts of the blocks subject to leasing in the alternative are discussed in section IV.B.3. The assessment concludes that the impacts and cumulative effects from the alternative should be substantially less for the marine resources in this part of Cook Inlet than the impacts assessed in alternatives I, IV, and V. However, based on the justification for the block deletion, the impacts and cumulative effects on the stationary crab fishery in lower Cook Inlet should be substantially the same as assessed in alternatives I, IV, and V.

B. Mitigating Measures

All comments concerning the mitigating measures section of the DEIS (sec. II.B.1.b.) were discussed during field level interbureau coordination meetings held on November 14, 18, and 26, and on December 4, 1980, and at a Washington level interbureau coordination meeting on January 30, 1981. Refer to section II.B.1.b. of this FEIS for background information, wording, and evaluation of each potential mitigating measure.

Issue: The stipulation concerning the protection of cultural resources was considered to require more than is necessary to protect cultural resources that may occur in the proposed sale area.

Source: Heritage Conservation and Recreation Service (HCRS).

Response: The HCRS submitted a revised version of this measure at a field level interbureau coordination meeting. After some minor modifications, consensus at the field level meetings was that this measure replace the one that appears in the DEIS. This issue was discussed at the Washington level interbureau coordination meeting. Consensus was reached to use the wording that appears in the DEIS for this proposed sale and in the final sale notice for sale 55.

Issue: Potential Mitigating Measure No. 1 - Well and Pipeline Requirements. Comments received by ARCO and AOGA indicate they consider this measure unnecessary because OCS Orders 1 and 3 already provide adequate mitigation, and the proposed measure does not provide economic justification for such a requirement. The State of Alaska comments indicated concern about a potential problem that crabs may not be able to climb over a smooth pipeline, and that a network of gathering lines could block or channelize essential movements of crab populations. The State also suggested additional wording to require that the Coast Guard receive notification of any subsea hazards so they can publish such information in a local Notice to Mariners.

Sources: Atlantic Richfield Company (ARCO), State of Alaska, Alaska Oil and Gas Association (AOGA).

Response: An unburied pipeline would likely become encrusted within months after being installed so that any potential problem a smooth pipeline would cause to movements of crabs would be temporary. The issue of smooth pipelines causing a change or blockage of crab movements is one that could be further studied before possible development phase pipelines are laid and a development EIS is written. As a result of field and Washington level interbureau coordination meetings, this measure has been deleted from the FEIS for the following reasons:

Existing OCS Orders Nos. 1 and 3 require that all subsea objects hazardous to navigation or commercial fishing be marked by navaids as directed by the U.S. Coast Guard. OCS Order No. 3 requires that all casing, wellheads, and pilings, when abandoned, must be removed to a minimum depth of 5 meters (16 ft) below the ocean floor; and that temporary abandonments must be identified and marked, as directed by the Coast Guard, when a casing stub extends above the ocean floor.

U.S. Coast Guard regulations provide for marking and protection of subsea objects. Obstructions must be accurately reported and the location published in a public notice. The U.S. Coast Guard has regulations, 30 CFR 147 (Federal Register, May 1, 1980), which establish "safety zones" around OCS objects in other OCS areas.

Rights-of-way are subject to environmental safety assurance through regulations requiring best available and safest technology (BAST) and regulatory and CZM consistency reviews (OCS Lands Act, Section 5(e), as amended).

Issue: Potential Mitigating Measure No. 2 - Transportation of Hydrocarbons. The State of Alaska suggested addition of a reference to the Port and Tanker Safety Act of 1978 (336 U.S.C. 1221), additional wording to require "direct communication and cooperation, determined jointly between the State and Federal governments," concerning the routing of any pipelines carrying OCS products to shore, and additional wording to provide for "free movement and safe passage of migratory epibenthic organisms." ARCO and AOGA expressed concern, in their comments, that the proposed measure is unnecessarily rigid in that it requires pipelines to shore in almost all cases, and that it does not "provide the proper flexibility afforded by adequate planning" (AOGA).

Sources: State of Alaska, Atlantic Richfield Company (ARCO), Alaska Oil and Gas Association (AOGA).

Response: As a result of field and Washington level interbureau coordination meetings, it was decided to include the reference to the Port and Tanker Safety Act. Opportunities for direct communication and cooperation between the State and Federal governments concerning pipeline routing, exist through CZM consistency review and the BLM pipeline permitting process. Concerning the suggested wording on provisions to allow free passage of migratory epibenthic organisms, refer to the response to comments for potential mitigating measure No. 1.

Issue: Potential Mitigating Measure No.3 - Environmental Training Program. The State of Alaska suggested additional wording to emphasize avoidance of conflicts with commercial fishing operations and gear. ARCO emphasized their interest in providing such training to their employees.

Sources: State of Alaska, ARCO.

Response: As a result of field and Washington level interbureau coordination meetings, it was agreed to add language to this measure to highlight the concern regarding potential conflicts between the oil and gas industry and the commercial fishing industry.

Issue: Potential Mitigating Measure No. 4 - Disposal of Muds, Cuttings, and Formation Waters. The State of Alaska expressed concern that insufficient information exists to adequately "assess the impacts of formation waters and drilling muds on the different marine environments in the proposed sale area," and that the collection of any additional information is solely at the discretion of the DCM. Further, concern was expressed that if a conflict were to exist between biological resources and discharges of these products, the DCM is not required to stipulate an alternative means of disposal. ARCO and AOGA concurred with the DEIS that the measure be deleted. The Kodiak Island Borough OCS Advisory Council suggested a seasonal restriction on the disposal of muds and cuttings and suggested a more conservative method of disposal to protect the young of commercial and noncommercial species of fish and shellfish.

Sources: State of Alaska, ARCO, AOGA, Kodiak Island Borough OCS Advisory Council.

Response: As a result of field and Washington level interbureau coordination meetings, it was again agreed to delete this measure. The EPA has statutory authority (PL 92-500, the Clean Water Act and Amendments of 1977, Section 403) to permit the discharge of any pollutant into the territorial seas. This regulatory procedure is supported in OCS Order No. 7. OCS No. 7 requires the lessee to submit a copy of the EPA Discharge Permit to the Deputy Conservation

Manager for Offshore Field Operations (DCM), and obtain the District Supervisor's approval for the method of muds, cuttings, and produced water disposal.

Through Coastal Zone Management Consistency Review and other regulatory review procedures, Federal and State agencies are given the opportunity to comment on and recommend changes to proposed disposal techniques. An Environmental Assessment (EA) or Impact Statement (EIS) is prepared for each proposed OCS plan wherein drilling programs and pollutant discharge techniques are identified. The EA or EIS is also available for review by Federal, State, and local agencies.

The DCM may require, at the request of a reviewing agency, that the operator change his proposed discharge plan prior to approval of any drilling activity. The DCM may approve the plan with conditional requirements which prohibit a particular discharge practice.

The regulatory requirements described above will identify and provide protection in those specific areas where discharges are to occur.

Issue: Potential Mitigating Measure No. 5 - Protection of Biological Resources. The State of Alaska expressed agreement with the measure, but suggested that the words, "the DCM may require" a survey, be deleted. ARCO agreed with the intent of the measure, but expressed concern that it is too broad, and that it gives the DCM "wide discretionary powers to alter or halt OCS exploration or development activities without requiring a factual basis for his action." In addition, ARCO indicated that existing regulations would have the same effect as this proposed measure. AOGA expressed its support of this measure and suggested additional wording that would require the DCM to consult with the U.S. Fish and Wildlife Service and/or the National Marine Fisheries Service, as appropriate, to determine whether additional protection of wildlife would be necessary, and also to consult with these two agencies regarding any other mitigating measures that would be necessary to protect wildlife.

Sources: State of Alaska, ARCO, AOGA.

Response: The intent of a stipulation is to provide additional protection to a resource and to mitigate adverse impacts to the environment resulting from oil and gas leasing. The degree of protection provided is in addition to measures already required by existing regulations, rules, or orders. Stipulations are made a part of the lease and impose an obligation upon the lessee. Opportunities exist for communication and consultation between the DCM and representatives of other government agencies. As a result of field level interbureau coordination meetings, it was agreed to include this measure in the FEIS, as it was written in the DEIS, because it affords additional protection to wildlife that is not provided by existing regulations, rules, or orders.

Issue: Information to Lessee on Bird and Mammal Protection. The State of Alaska agreed with the wording of this measure as it appears in the DEIS, and suggested it be included in the FEIS. AOGA and the Marine Mammal Commission had questions as to the intent of this measure. NOAA submitted revisions to the measure so that the recommended guideline more closely approximates the provisions of the relevant acts.

Sources: State of Alaska, AOGA, National Oceanic and Atmospheric Administration (NOAA), and the Marine Mammal Commission.

Response: The purpose of this Information to Lessee is not to interpret relevant legislation, but, rather, to advise the lessee of a practical approach to minimize potential disturbance of wildlife (harassment, significant or other). At present, there are no clear guidelines or regulations regarding what constitutes "harassment" of various species and to attempt such definitions or focus on such a concept herein would only serve to confuse the lessee or suggest a greater knowledge of marine mammal behavior and its consequences than presently exists. The present Information to Lessee clearly states that animal behavior is variable and that the lessee must exercise appropriate discretion and responsibility at all distances from observed animals or known concentration areas. A 1-mile distance (which implies horizontal and vertical dimensions) would probably afford more protection than minimum distances suggested by NOAA (i.e., 1,000-ft elevation and 500-yd lateral distance). Also, the 1-mile minimum recommendation would afford more protection to wildlife from those who feel obligated to test such a recommendation to its threshold. Obviously, all distance recommendations are subject to criticism. The 1-mile distance is conservative and probably more practical under field conditions than those suggested by NOAA. Based on NOAA's comments, the second sentence in the second paragraph has been altered to read, "Behavioral disturbance of most birds and mammals found in or near the sale 60 area would be unlikely if ocean vessels and aircraft maintain at least a 1-mile distance from observed wildlife or known wildlife concentration areas such as bird colonies or marine mammal rookeries (additions underlined). Another sentence is inserted thereafter stating, "Therefore, in concurrence with the National Marine Fisheries Service and the U.S. Fish and Wildlife Service, it is recommended that aircraft or vessels operated by lessees maintain at least a 1-mile distance from observed wildlife or known wildlife concentration areas."

In regard to questions raised by the Marine Mammal Commission, the intent of the Information to Lessee on bird and mammal protection is to provide general guidelines for the operation of vessels and aircraft, and advise lessees that they may be cited for violation of the Marine Mammal Protection Act or Endangered Species Act. As comments of the Marine Mammal Commission suggest, such guidelines may not be enforceable. This is exactly why this provision is an Information to Lessee rather than a stipulation. Appropriate legislation and enforcement authority already exist under the Marine Mammal Protection Act and the Endangered Species Act. The Information to Lessee clearly indicates the responsible authorities. Official consultations with the U.S. Fish and Wildlife Service have been performed in arriving at these decisions in accordance with the procedures set forth in the Departmental Manual (part 655, chapter 1). Field level representatives of the National Marine Fisheries Service have participated unofficially in the interbureau coordination meetings, and have concurred with this approach. Therefore, it is felt that sufficient consultation with appropriate agencies has been performed regarding this measure.

Issue: Information to Lessee Concerning Fairways. The State of Alaska recommended additional wording to include consideration of critical fishing areas.

Source: State of Alaska.

Response: As a result of interbureau coordination meetings, it was agreed to alter this measure to incorporate the wording suggested by the State of Alaska.

Issue: The State of Alaska recommended several additional issues be included as mitigating measures in the FEIS: that a biological task force be established for this proposed sale, that a development EIS be written, and that critical fishing areas be protected by a seasonal restriction on OCS operations so as not to displace commercial fishermen or damage their gear. Additional protection may be achieved by the establishment of a committee composed of commercial fishing industry/petroleum industry representatives to arbitrate conflicts between the two industries, and/or by deleting blocks from the proposed sale. The State also expressed concern that oilspill response capabilities are inadequate in Alaska, identified oilspill containment and cleanup performance standards, and suggested that these standards be provided by the U.S. Coast Guard to the Geological Survey, to the lessee, and be included in the Notice of Sale.

Source: State of Alaska.

Response: Commercial fishing interests are protected through the OCS Lands Act, as amended, which provides, among many things, compensation for losses to commercial fishermen due to OCS activity and for coastal zone consistency consultation between the lessee and the State of Alaska. The issue of potential conflict between the commercial fishing industry and the oil and gas industry will be further addressed in detail if and when commercial quantities of hydrocarbons are discovered, a development and production plan is submitted, and a development EIS is written. Section 25(e) of the Outer Continental Shelf Lands Act, as amended (43 U.S.C. 1331-1351(e)), requires that at least one development EIS be written "in any area or region (defined by the Secretary) of the Outer Continental Shelf, other than the Gulf of Mexico."

The seasonal drilling stipulation imposed on leaseholders and the establishment of a biological task force in conjunction with the Beaufort Sea lease sale, were based on the severe ice conditions in the area, unproven technology, the migratory movements of the endangered bowhead whale, and the clearcut seasonality of biological activity in the area. There is little comparability between the conditions encountered in the proposed sale 60 area and those in the Beaufort Sea. Because of the year-round biological activity in the proposed sale 60 area, this issue will be further addressed if and when commercial discoveries of petroleum have been made, and there is a clear idea of where platforms would be placed. This issue would be considered in detail in a development EIS.

While the establishment of a committee to arbitrate potential conflicts between the fishing and petroleum industries is a good idea, the two industries should work together to establish it.

The block deletion recommendation of the State has been analyzed in this FEIS (secs. IV.B. and V.A.) and will be considered by the Secretary of the Department of the Interior before he makes a decision on whether to conduct this proposed sale.

C. Approach, Assumptions, and Methods Used

1. Oilspill Risk Analysis:

Issue: Some commenters disagreed with the expected number of four spills greater than 1,000 barrels that were projected to occur over the 26-year life of the field. According to an industry spokesman, the spill rate should be based on the 15 years of experience in oil and gas activities in upper Cook Inlet. These statistics are thought to be more reflective of the current "state-of-the-art" for the industry, especially the period from 1971 to 1980 (see table V.C.1.-1).

Sources: AOGA, S.C. Matthews.

Response: The U.S. Geological Survey historical spill data base used in the oilspill risk analysis incorporates oil drilling activity on the entire Outer Continental Shelf of the United States. This is still a small sample with respect to the number of spills and the volume of oil handled internationally. For platform spills, there are only nine spills of greater than 1,000 barrels on record for the period of 1964 to 1979. The most recent spill occurred in the Gulf of Mexico on November 23, 1979. Of the nine platform spills, five were blowouts and four were non-blowout spills.

The historical record for oilspills occurring from pipelines on the outer continental shelf of the United States is only seven spills from 1967 to 1976. This amounts to about 2.3 billion barrels of oil transported via pipelines per spill incident. The third spill statistic used by the USGS is for tanker transport incidents, which is determined on a world-wide basis from 1969 to 1973. In this case, there were 178 incidents greater than 1,000 barrels reported, or about 3.9 spills for every billion barrels of oil transported by tanker. The four expected spills, based on the resource estimate of the proposed sale area, is merely an additive function of spills from platforms, pipelines, and tankers.

When using past spill rates as indicators of future spill rates, a decrease could be assumed to follow based on experience and improved standards. This may explain in part the low spill rate and spill volume which occurred in upper Cook Inlet from 1971 to 1980. Conversely, an increase in spill rate may occur due to some unknown conditions in a new or frontier lease area. This assumption is supported in part by the higher spill rate in upper Cook Inlet from 1965 to 1970 (see table). The USGS analysis of spill rates takes a middle ground position between these two assumptions and thus uses a spill rate that is strictly a function of volume of oil handled.

The problems with using a smaller data base, such as upper Cook Inlet from 1971 to 1980, is that should several major spills occur, the resulting predictive spill rate could result in an overestimate of the expected spill number. Another factor to consider is the number of spills and volume of oil produced. While the number of spills and spill volume has decreased significantly from 1971 to the present, the volume of production has also decreased significantly from 79 million barrels in 1971 to 43 million barrels in 1979. The data base is further obscured for the upper Cook Inlet activity by those incidents in which the volume of several spills was not recorded (table V.C.1.-1).

The OCS oilspill data base is under constant review. There are studies being conducted by USGS and separately by outside contractors sponsored by the BLM studies program. The most recent reviews provide preliminary indications that the production spill rate is beginning to display a downward trend. If this

Table V.C.1.-1.
Oil Spills in Upper Cook Inlet, 1965-1980

Year	Production Volume (MMbbls)	Oil Industry Spill Volume		Other Sources Spill Volume		Unknown Sources Incidents
		bbls	Incidents	bbls.	Incidents	
1965	1	160	1			0
1966	14.4	4,855	28	30	2	13
1967	29.0	1,824	47	10,000	1	26
1968	66.1	1,070	49	389	17	18
1969	74.3	918	21	6,243	10	12
1970	81.0	1,039	23	3,984	9	31
1971	79.0	72	12	1,794	6	15
1972	74.0	19	8	32	7	1
1973	73.1	24	6	29	8	1
1974	72.2	19	25	268	7	4
1975	72.0	12	3	18	4	3
*1976	67.0	52	13 (3)[1]	28	19 (6)[1]	5
*1977	66.1	12	14 (1)[1]	16	26 (6)[1]	8
*1978	50.1	14	7 (2)[1]	7	18 (4)[1]	10
*1979	43.0	4	6 (1)[1]	18	15 (2)[1]	5
*1980		8	4	55	9 (3)	4

Figures 1965-1975 are from BLM, FEIS Lower Cook Inlet Sale CI

*This part of the table was compiled by ARCO using records obtained from the U.S. Coast Guard in Anchorage, Alaska.

[1] The number in parentheses indicates the number of spill incidents for which there was no volume report.

trend is substantiated, the production spill rate used in the oilspill probability model will be changed. Since the oilspill probability model is used for predicting circumstances over periods of two to three decades, there is no justification to alter spill rates based solely upon the limited time and/or production experience of a single geographic region. Consider, for example, that human error is one of the most frequently cited causes for mishaps leading to large spills. To limit the historical data base to non- or limited incidence regions, in a predictive analysis, is to suggest a regional dependence on the human process. We know of no basis supporting the hypothesis that human error has any regional dependency. The central issue to establishing reliability upon regional oilspill data bases is length of experience; measured by time of production and volume produced (assuming that volume produced remains the best exposure variable). An ongoing BLM contracted study is addressing the issue of regionalized data bases and evaluation of alternative exposure variables.

Issue: There should be a discussion of the data that form the basis for oilspill risk analysis trajectory calculations.

Source: Office of Marine Pollution Assessment/Outer Continental Shelf Environmental Assessment Program (OCSEAP).

Response: The published reports that were used to develop the summer and winter net current patterns include Meunch et al. (1978, 1980), Schumacher, et al. (1978, 1979), and Reed, et al. (1979). Additional sources are listed in section III.A.2.b. Tidal current patterns were developed by Dames and Moore (1979) with the aid of a two-dimensional hydrodynamic tidal model (Mungall and Matthews, 1973, and Mungall, 1973). The meteorological data base used in the trajectory analysis was based on previous trajectory simulations by Dames and Moore (1979, 1976), Putnins (1966, 1969) and updated by PMEL (1980). For a more detailed descriptive analysis of the meteorology used in the trajectory developed, see Schlueter (1980) and LaBelle, et al. (1980). Additional sources are listed in section III.A.2.b. and IV.A.1.d.

Issue: Several commenters stated that recent evidence from infrared photographs has suggested there are major discrepancies in the circulation model of the lease sale area.

Sources: Kodiak Island Borough, Kodiak Island Borough OCS Advisory Council.

Response: The importance of these findings are presented in the revised section III.A.2.b., Physical Oceanography. In actuality, this additional evidence has further substantiated the hydrographic model system of the lease sale area (Hufford, personal communication).

Issue: A question was raised concerning the spill size used in the oilspill risk analysis in relation to the spill size defined in the National Oil and Hazardous Substances Pollution Contingency Plan for a major discharge in coastal waters.

Source: Kodiak Island Borough.

Response: All oilspill frequency estimates used in the oilspill risk analysis were based on frequency estimates for spills greater than 1,000 barrels. This definition of a major spill is used by USGS as the basis for the collection and aggregation of statistical data used for computer model simulation. A major discharge in coastal waters is defined as more than 2,380 barrels in the National Contingency Plan. A discharge of greater than 1,000 barrels approximates the upper limits for a medium discharge according to the Plan, where a medium discharge is defined as ranging from 238-2,380 barrels. Essentially, there is no relationship between the nomenclature used by the two sources of definition. Regardless of apparent definitional inconsistency, however, a spill of greater than 1,000 barrels or the potential for such a spill in Alaskan coastal waters would be a significant spill incident requiring the mobilization of all possible response resources.

Issue: The analysis in the DEIS does not examine the quantitative difference in the effects of major and minor oilspills.

Source: AOGA.

Response: For a discussion of effects from major oilspills see section IV.A.2.g.-h. of the FEIS. A more limited data base of chronic or background levels of petroleum hydrocarbons and related effects are presented in section III.E. of the FEIS.

Issue: A discussion of the expected concentrations of oil in the water column is needed in the EIS.

Source: Office of Oceanic and Atmospheric Services (NOAA).

Response: The text has been modified to include this data.

2. Design of Alternatives and Development Scenarios:

Issue: A number of comments were submitted on the subject of OCS lease sale CI, including questions on why blocks deleted from CI were included in sale 60; why the development scenario assumes production from sale CI, especially since there has been an absence of discovery; and why the DEIS does not assess impacts based on exploration only for sale CI.

Sources: Alaska Chapter of the Sierra Club, U.S. Geological Survey, AOGA, and Lee Stratton.

Response: It is the practice of the Department of the Interior to include all blocks not leased in a previous sale in a second generation lease sale for evaluation in the tract selection and environmental impact assessment processes. The resource estimates for sale CI are included as part of the total resources estimated for sale 60 in the cumulative case since the sale has been carried out and the area continues to be under exploration. Regardless of current success or failure in discovery, the potential still exists for the discovery of a commercially productive field. This potential, combined with the operational and transportation activities presently in Cook Inlet, have contributed to the potential of oilspill risk in the cumulative case, resulting in assessments of incremental impact from sale 60 in the main to Cook Inlet resources. Impact assessment using the exploration only case for sale CI potentially could separate out and make more visable the potential effects of sale 60 itself, but such an analysis would be unrealistic when considering the need to keep in mind the production potential of the existing lease sale area.

Issue: Concern was expressed in a number of commments that the estimated timing of activity in the development scenarios was overly optimistic.

Sources: AOGA, State of Alaska.

Response: The estimated timing of activities contained in the development scenarios is as provided by the USGS, based on their experience in OCS oil and gas activities and on the assumptions contained in the scenarios.

Issue: The increase in the mean level of estimated resource availability from 160 million barrels of oil in the FEIS for the 5-year oil and gas leasing schedule to the 670 million barrels used in the DEIS for sale 60 must be explained.

Source: Kodiak Island Borough.

Response: The difference is explained on page 45 of the 5-year OCS oil and gas leasing schedule FEIS. The resource estimates used in the 5-year FEIS are risked estimates, in that the probability that no oil may be found is factored into the estimates. When environmental statements are prepared for individual sales included in the 5-year schedule, "conditional" estimates of resources (those that assume the area to be hydrocarbon productive), which are based upon the specific sale area, are used for impact assessment. Therefore, a better assessment of impact, should the sale occur and be hydrocarbon productive, will be performed.

3. Environmental Studies and Data Gaps:

Issue: A major issue identified in the comments was the availability and adequacy of biological, geological, and other data in the lease sale area, especially in the Shelikof Strait. Some commenters suggested specific topics for study; others noted general data gaps.

Sources: State of Alaska, Kodiak Area Native Association, Friends of the Earth, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Marine Mammal Commission, Environmental Protection Agency, Office of Marine Pollution Assessment/OCSEAP (NOAA), Kodiak Island Borough OCS Advisory Council, and Derek Stonorov.

Response: Completed studies referenced in comments have been incorporated into the text. Major revisions in the text additionally have been made in recognition of the need for clarity in the use of existing data. The adequacy of the current level of scientific data, especially for Shelikof Strait, is addressed in section IV.A.4., under the Delay of Sale alternative. This section on the impacts of delaying the proposed sale examines the adequacy of the data base that presently exists as opposed to that which might exist in the near future. The adequacy of the present data on biological resources in particular is addressed in sections IV.A.4.a.-g., an examination of coastal habitats, commercial and sport fish, commercial fishing, marine and coastal birds, marine mammals, and terrestrial mammals. Appendix I has been updated to contain the most current listing of reports published by the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Outer Continental Shelf Environmental Assessment Program.

The environmental geology data base for the lease sale area has been significantly augmented in the FEIS. Environmental geology information from the USGS in map form, previously not available for the DEIS, has been inconcluded in appendix M. Examination of these geotechnical maps clearly demonstrates the geological data gap in Shelikof Strait has been corrected. In addition, research by Drs. Pulpan and Kienle provides ample information on the seismicity and potential volcanic hazards of lower Cook Inlet. Please refer to the FEIS for sale CI for more information on this area, information not replicated in the DEIS for purposes of brevity and focusing on specific impact subjects. Annual reports by Kienle and Hampton may become available during the latter processing of the FEIS. Every effort will be made to incorporate any information from these studies that would have a significant impact on the identification of unavoidable geohazardous blocks in the FEIS or Secretarial Issue Document. These studies have been referenced in the FEIS.

A suggestion was made in one comment that certain studies funded by BLM and yet to be completed be mentioned as sources of data which may reduce uncertainties in predicting impacts for the near future. To specifically mention any particular study may suggest to the reader that it has higher probability of success than other research, including work not funded by BLM. However, this is not necessarily so and we wish to avoid potential misinterpretations. Many studies may reduce present uncertainty but there is no basis for identifying a specific one until it is completed and has demonstrated that its results would have a significant influence on OCS management decisions. The purpose of the EIS is to predict possible impacts, not to predict whether studies will yield significant conclusions.

Issue: Within the general subject of geological hazards, concern was expressed in one comment about the relationship between specific sediment conditions in lower Cook Inlet and Shelikof Strait and the availability of ground acceleration data from accelerogram research.

Source: Office of Marine Pollution Assessment/OCSEAP.

Response: The use of accelerometers by Pulpan and Kienle was initiated only in the past few years and no high magnitude earthquake (7 or greater on the Richter Scale) has occurred in close proximity to lower Cook Inlet. As a result, the response of sediments in lower Cook Inlet cannot be determined in a scientific manner until accelerograms from a large magnitude earthquake in lower Cook Inlet are recorded and available for analysis. It is hoped the seismicity studies of Pulpan and Kienle would continue until an adequate scientific data base of accelerogram information has been established. Studies in the past by Hampton in lower Cook Inlet have clearly established the physical characteristics of the sediments of the area. Unfortunately, without acclerogram data from large magnitude earthquakes in lower Cook Inlet, it would be difficult to precisely define the attenuation characteristics of these sediments from local high magnitude seismic events. In fact, there is a dearth of accelerometer data for large magnitude events outside of Cook Inlet as well. Thus, extrapolations from other areas are still not reasonable on a scientific basis until the seismic data base for large magnitude earthquakes improves.

4. Other Procedural Aspects:

Issue: The alternatives contained in the DEIS were cited in several comments as inadequate in light of CEQ regulations, as only variations of a single proposal and not encompassing a range of reasonable and available alternatives. The analysis of alternatives was likewise seen as inadequate, in that the DEIS failed to adequately analyze the no sale alternative or alternatives outside the jurisdiction and control of the BLM.

Sources: Kodiak Island Borough, Kodiak Island Borough OCS Advisory Council, Friends of the Earth.

Response: Proposed sale 60 is part of the larger 5-year leasing program for federal lands on the OCS. The substitutability of alternative energy sources has been evaluated within the context of the 5-year program (see sale 55 FEIS and the FEIS for the 5-year OCS program). The block deletion alternatives used as the basis for analysis in the DEIS are considered a workable number to serve as the basis for a reasoned choice within the context of a lease sale decision. In this context, the EIS offers a wide range of alternatives, including the no sale and delay the sale cases, suitable for determining reasonable differences of impacts and consequent reasoned choice among alternatives.

Issue: The DEIS contains no assessment of economic and technical benefits of the planned action weighed against the environmental costs.

Source: Kodiak Island Borough.

Response: The CEQ regulations require that if a cost/benefit analysis is prepared, that it be incorporated by reference or appended to the environmental statement. Cost/benefit analyses are not performed on proposed OCS lease sales. The regulation also states:

> For purposes of complying with the Act, the weighing of the merits and drawbacks of the various alternatives need not be displayed in a monetary cost-benefit analysis and should not be when there are important qualitative considerations. In any event, an environmental impact statement should at least indicate those considerations, including factors not related to environmental quality, which are likely to be relevant and important to a decision.

The Bureau of Land Management believes that this requirement has been met.

Issue: A commenter suggested that OCS leasing could violate the Marine Mammal Protection Act of 1972 and the Migratory Bird Treaty Act of 1918 by imposing high risks to marine and migratory populations.

Source: Kodiak Island Borough.

Response: A considerable effort was made in the EIS to assess potential impacts and cumulative effects of the proposed action and respective block deletion alternatives on marine and avian populations. OCS leasing alone would not pose a threat to marine mammals and migratory birds. The potential effects from leasing, however, could be such to present the possibility of violating the laws cited. The likelihood of such potential effects occurring is speculative and must be considered in the context of the body of law within which the OCS program operates.

D. Environmental Impact Assessment

1. Cumulative Effects with Proposed OCS Sale 61:

Issue: A comment frequently raised was that the DEIS was inadequate by failing to address the cumulative effects of proposed OCS sale 61 with OCS sale 60. In particular, commenters stated that 1) consideration of cumulative effects is essential if the decisionmakers are to be alerted to realistic consequences of the proposed action; 2) the cumulative impacts of other projects that can be expected to have similar impacts as a proposal must be acknowleged; 3) the consideration of cumulative impacts of sale 60 and 61 within the DEIS for proposed sale 61 is unacceptable because a leasing decision will already have been made on sale 60; and 4) in the absense of specific information on OCS sale 61, the cumulative impact assessment of the two sales can be predicated on information from the DEIS on previously proposed OCS sale 46, as well as the presently proposed sale 60.

Sources: Trustees for Alaska, Kodiak Island Borough, Friends of the Earth, Kodiak Island Borough OCS Advisory Council, Fish and Wildlife Service, National Oceanic and Atmospheric Administration, National Marine Fisheries Service.

Response: The cumulative impact assessment of proposed sale 61 at this time in the context of the EIS for sale 60 would be premature and speculative, since the lease sale has yet to be defined in specific terms. The projects considered in examining the cumulative effects of proposed sale 60 are described in section IV.A.1.h. With regard to proposed OCS sale 61, the decision to conduct OCS sale 60 is not the final decision regarding OCS operations in this sale area; it merely grants to a lessee an interest in submerged lands with a specified burden of performance. Subsequent decisions are made by the Department of the Interior and other state and federal agencies. Authority is available under the OCSLAA for the Department of the Interior to suspend or cancel OCS leases when a determination is made that further OCS operations would pose a threat of damage to marine life, among other reasons (43 U.S.C. 1334(a)(1)). Given this brief description of the series of decision points ensuing from both OCS sales 60 and 61, opportunities will be available in the future to consider the issue of cumulative effects of both sales.

An estimated schedule of significant decision points regarding the two sales is offered here to demonstrate this point. This schedule also identifies opportunities for future cumulative impact assessment of the two sales which would be more meaningful for purposes of OCS decisionmaking and environmental assessment.

February 1981	FEIS on sale 60 issued; Tract Selection on sale 61 completed (OCS 5-year leasing schedule).
April - June 1981	USGS preparation of sale 61 resource estimates; BLM/OCS preparation of sale development scenario (USGS and BLM estimates).
August 1981	OCS sale 60 scheduled occurrence (OCS 5-year leasing schedule).
December 1981-	OCS sale 60 exploration plan submittals and approval

January 1982	(BLM estimates).
March 1982	DEIS on OCS sale 61 released (OCS 5-year leasing schedule).
September 1982	FEIS on sale 61 released (OCS 5-year leasing schedule).
March 1983	OCS sale 61 scheduled occurrence (OCS 5-year leasing schedule).
June 1984- June 1985	Preparation and adoption of development and production plan EIS on OCS sale 60 (BLM/OCS Petroleum Development Scenario).

Proposed OCS sale 61 is not a tangible leasing proposal for purposes of environmental assessment under NEPA until resource estimates are prepared, tracts are selected for further study in an environmental statement, and a development scenario is formulated against which the impact assessment can be performed. The previous schedule indicates that these three types of information would not be available before approximately June of 1981. For cumulative impact assessment to be performed on OCS sale 61 in the FEIS on sale 60, a speculative set of assumptions would have to be contrived in order to define a "proposal." It is argued in the comments that information from the sale 46 DEIS could be used as a surrogate for the yet to be defined lease sale 61 area. Such analysis would be speculative because critical features of the sale 61 proposal, such as the industry tract nomination pattern, the USGS resource estimates, and the petroleum development scenarios, could be significantly different from the previous sale 46 DEIS.

The appropriate decision point for an initial cumulative effects assessment of OCS sales 60 and 61 would be the DEIS on proposed sale 61. The review of the estimated schedule previously listed shows that sale 60 should occur in August 1981, with the lessees' exploration plans anticipated to be submitted in the winter of 1981-1982. For purposes of cumulative effects assessment of sale 60 with 61, the post-sale 60 information would be quite helpful. Specifically, the tracts bid upon and leased in sale 60 will have been identified, and the exploration plan and onshore facility support proposals, as well as oilspill contingency planning logistics, will have been identified. This discrete site-specific information will enable the EIS authors to prepare a more realistic cumulative effects assessment of the two proposed lease sales.

Moreover, with the cumulative effects assessment being performed with the DEIS on sale 61, the specific assumptions and information on the sale 61 lease area, resource potential and onshore support activities, will have been identified. The combination of this discrete information for both sales 60 and 61 will result in better identification of cumulative effects, their probability of occurrence, and future management practices that will mitigate or void the impacts. A critical example of the advantageous timing of this assessment would be the oilspill risk analysis performed on sale 60 and 61. Resource estimates for both sales would be available and specific trajectory points for sale 60 would be known instead of hypothesized.

It should be emphasized that the preparation of cumulative effects assessment on sale 60 and 61 with the issuance of the DEIS on sale 61 will not be the only forum for such analysis. Moreover, the significant development and production decisions for either sale 60 or 61 will probably occur 4 or more years later, the earliest such date being 1984 for anticipated development and production plan submittals on sale 60. If a commercial find of hydrocarbons is made in sale 60, then the development and production EIS prepared for the development and production plan submittals would include further cumulative effects assessment between the sale 60 and 61 operations. At this juncture, the decisionmakers should have more detailed information on the cumulative effects of the two sales than with the earlier DEIS on sale 61. Thus the process of cumulative effects assessments works inductively with the development of OCS proposals, which are long-term, subject to decreasing uncertainty, and characterized by sequential decisions.

2. Biological Environment:

Issue: One commenter questioned the degree to which BLM has consulted with the National Marine Fisheries Service (NMFS) and/or the U.S. Fish and Wildlife Service (FWS) to assess specific protective measures for non-endangered species or populations of marine mammals.

Source: Marine Mammal Commission.

Response: Specific and detailed consultation on matters relevant to non-endangered marine mammal protection has occurred as a part of formal meetings under Secretarial Order 2974 (DM 655). These meetings have included representatives from both FWS and NMFS (unofficial participant), and have been directed at the formulation of mitigating measures compatible with the needs in the lease sale area and capabilities of all agencies involved. Ongoing consultation is facilitated, as well, through the BLM sponsored OCSEAP studies program and environmental research synthesis meetings. Other means of interaction have been employed, including the scoping process, request for resource reports, tract selection, review of the DEIS through public hearings and comments, and on-going discussions with various officials of NMFS/FWS and other agencies. Leasing stipulations, notices to lessee, and leasing decisions are directly affected by these processes. A substantial effort has been made to facilitate interagency communication, and the EIS clearly lists all agencies with which BLM has consulted. It would be unwieldy to detail all subjects discussed with each agency, but those concerned are assured that the protection of non-endangered marine mammals has been a priority subject.

Issue: Several commenters suggested the Cook Inlet beluga population has the potential of being severely impacted by OCS activities, especially since it is a small population which potentially is distinct from others in genetic character. Therefore, criticism is made of the conclusions reached in the DEIS that OCS activities will have little impact on these whales.

Sources: State of Alaska, Marine Mammal Commission.

Response: In general, it is likely that the relative severity of a specific impact on the status of a population is inversely related to its size. Thus, we concur that impacts on belugas in Cook Inlet could be of more long-term consequence than if sustained by a more abundant population. Also, human valuation of a population may be directly related to genetic uniqueness, e.g., a subspecies may be of more intrinsic value than a species. However, it is generally unknown how eventual development of offshore oil and gas resources would affect beluga whales in the lower Cook Inlet and Shelikof Strait. There is no literature that shows conclusively that beluga whale populations have a distinct physiological or behavioral sensitivity to any type of effect due to oil pollution, noise, or other factors associated with offshore oil and gas exploration. Therefore, we believe to conclude that the Cook Inlet beluga population is potentially very sensitive to perturbations associated with OCS development is no more valid than to conclude that it is not. This is why we stated:

> "However, the extent of ultimate effects of spills on beluga whales are unclear, but most likely would be related to temporary or long term reduction of food supplies, due to mortality or decreased productivity of fish which may be present in the area, or possible avoidance by whales of affected areas."

We also stated that:

> "Present knowledge of petroleum-related activity and its relationship to cetaceans is insufficient to predict with high confidence the unavoidable adverse effects on endangered and non-endangered cetaceans."

In regard to cumulative effects of acoustic disturbance, we stated:

> "Due to present limitations, it is not possible to conclusively evaluate either long or short term cumulative effects of acoustic disturbance on cetaceans."

We did conclude that unavoidable effects of exploration (a phase involving the operation of no more than three rigs during any year of the exploratory period) would probably be minor and less than those of later phases. This conclusion is based on existing data which show the probability of a spill during exploration is very low (see Danenberg 1980, USGS Open File Report 80-101) and the amount of disturbance due to this level of exploratory activity is of similar proportions. Thus, the conclusion that unavoidable adverse effects of exploration on cetaceans are probably minor is valid and somewhat at variance from the interpretation of the conclusion that such activity will have little impact. We do not believe, at this time, that any additional information exists which could lead to a more complete assessment of the possible effects.

Issue: A commenter indicated that the DEIS tends to cite information on short-term direct effects and downplay the impact of oil on marine mammals, as well as making several suggestions for additional citations.

Source: Friends of the Earth.

Response: There is an emphasis in literature cited regarding information on short-term, direct effects. This is because there is relatively little literature available regarding studies of long-term effects, not by a wish to downplay any potential impacts. It was suggested the FEIS cite the "study" by Pearce, 1970, which had been quoted by Calkins, 1979, regarding aberrant behavior of grey seals coated by oil. We are aware of this reported behavior of grey seals but do not believe those specific observations can be considered substantial information which would alter basic conclusions regarding impact of the proposed sale or its alternatives on behavior of marine mammals native to lower Cook Inlet and Shelikof Strait. In the EIS, we have specified that physiological and behavioral effects could result from marine mammal contact with oil which would include such behavior as noted by Pearce. Also we concluded that:

> "It is possible that coating of animals or other contact with oil could inhibit such recognition and lead to pup abandonment and starvation."

We believe this statement stands on its own merits; it is not necessary to cite any additional literature related to marine mammal identification of young or individual orientation as suggested. Similarly, the literature clearly stated the potential sensitivity of sea otters to oil. We have included an additional reference to a study by Engelhardt, et al., 1977, which demonstrated conclusively that uptake of petroleum hydrocarbon as a result of immersion and/or ingestion can occur in certain phocid seals. The fact is that direct and indirect effects of a variety of manifestations may occur depending on the species and nature of exposure. The EIS clearly brings this out.

Issue: The relevance was questioned of including the discussion of the relative significance of disturbance of cetaceans due to small boat traffic and other non-OCS-related sources of noise.

Source: Kodiak Island Borough.

Response: The two paragraphs in question discussing the potential impacts of disturbance due to small boats, fishing vessels, and other noise sources on cetaceans, are most relevant, particularly as placed in the cumulative effects section. In order to predict the eventual status of a species or ecological community as a result of cumulative impacts, it is necessary to address as many as possible of the significant impact-producing agents and develop some perspective on the relative significance of each source. These paragraphs identify a major potential source of disturbance which, in conjunction with OCS activity, may affect cetaceans. In addition, it is stated that disturbance of cetaceans due to sources other than OCS activities "may be as much or more influence than petroleum industry impacts, either directly or indirectly," thus providing decisionmakers with additional perspective on the relative significance of such sources of disturbance.

Issue: The DEIS does not recognize the significance of the complexity of the marine ecosystem, especially its interacting, holistic, and synergistic aspects; and, therefore, no realistic evaluations of impacts can be made.

Source: Kodiak Island Borough.

Response: Identification of key interactions among major ecosystem components has been made throughout the EIS. Environmental impact analysis, because it is an analysis, results in a process by which system components are identified and fluctuations in major production functions of such components are predicted. Scientific endeavors have yet to provide an adequate total ecosystem model by which reliable predictions are possible. In fact, the theoretical development of systems philosophy is still in formative stages and does not yet represent an acceptable paradigm by which all scientific communities adhere. Scientific realism is limited by the precision of measurement techniques, none of which yet have revolutionized the present analytical methods to provide a widely acceptable index of holistic or synergistic outputs of ecosystems. Until synergism in ecosystems is a measureable output (and not merely a point of philosophic debate) through which various alternatives can be assessed, we must devote the bulk of our analysis to those which are most "real," e.g., species abundance, distribution, economic values, etc.

Issue: A number of commenters noted an apparent internal inconsistency in the DEIS regarding the relationship between impacts on fisheries resources and the impacts on the fisheries themselves.

Sources: State of Alaska, Kodiak Island Borough, Friends of the Earth, National Marine Fisheries Service.

Response: The apparent "inconsistency" between estimated impacts on fish species and commercial fishing exists because the impact assessments on fish populations and commercial fisheries were done separately. The analysis of fish species impacts is biologically-based, whereas an economic orientation is the basis for the analysis of fisheries impacts. A biological effect does not necessarily produce a major economic consequence. The analysis of fish populations generally pointed out that adverse impacts on commercially exploited species would, over the life of the project, be local, short-term, and moderate. The analysis also pointed out that because these species are commercially exploited and because of large natural population fluctuations, reductions may not be able to be attributable to activities from oil and gas development and production.

On the other hand, impacts assessed on the commercial fisheries were primarily based on direct conflicts and competition for ocean space, labor and dock space as well as the possibilities of loss of fixed fishing gear and the loss of marketability of a species because of flavor tainting rather than a reduction of species. The analysis provided in the FEIS is the result of our assessment based on all information on hand.

Issue: The subject of fisheries impacts was raised in a large number of comments, most in a generic sense but others with specific points to be made: assessing the economics of fisheries impacts; assessing the growing importance of bottomfishing; recognizing Shelikof Strait as a major bottomfishing and bottomfish rearing area, especially for Alaskan pollock; and assessing the high sensitivity of larval forms of life to hydrocarbons.

Sources: State of Alaska, Kodiak Island Borough, Kodiak Island Borough OCS Advisory Council, Trustees for Alaska, Oliver N. Holm, Dr. Paul L. Eneboe, Carole Demers, Carol Griswold, and Kenneth R. Carrasco.

Response: Technical corrections have been made as appropriate to recognize fisheries impact questions. Although already included in the EIS, emphasis was added on the high vulnerability of larval forms of marine life to oil and the importance of Shelikof Strait to the life cycle of bottom-dwelling fish populations. The growing importance of bottomfishing to the economy of Kodiak Island had been recognized in the description of the environment, where it was pointed out the limited amount of data available on this sector of the economy made it very difficult to assess impacts. No attempt was made to assess the economics of fisheries impacts, since these conceivably would be localized and subject to a wide variation of circumstances, not the least of which is the ability to take into account natural variations in fisheries resources populations as a function of assessing OCS impacts.

Issue: Information was provided by one commenter to support the position that oil and gas operations in the Cook Inlet area have not significantly affected the salmon catch there.

Source: ARCO.

Response: Based on information supplied through the oilspill risk analysis, salmon populations may be reduced because of this proposal. The impact on salmon fishing is expected to be local and short-term where it is estimated to occur.

Issue: Using the experience in upper Cook Inlet, one commenter took issue with the finding that man-made disturbance is a major potential for adverse effects on marine and coastal birds and marine mammals.

Source: AOGA.

Response: No evidence is supplied that existing activities have not been a problem. The effects of air traffic, especially helicopters flying over nesting bird colonies and mammal rookeries, have been documented in the Kodiak area, suggesting that the potential for adverse effects indeed does exist. The degree of adverse disturbance depends on where, when, and how frequent the disturbance occurred. The present level of activity may not be significant enough to cause a major adverse effect. However, increasing the level of oil and gas activity in Cook Inlet does have the potential for adding further disturbance levels to the point where the cumulative disturbance on bird colonies and/or mammal rookeries could be a major effect.

Issue: One commenter indicated the impacts assessed in the DEIS were not adequate in terms of reflecting the effects of increased human population on fish and wildlife resources.

Source: National Marine Fisheries Service.

Response: A major factor that drives the impacts assessment is the estimate of increased human population that may result from the lease sale during the exploration, development, and production phases of operations. The effects of increased human population on fish and wildlife resources has been incorporated into the EIS. In addition to effects on the biota, the potential for increased hunting and fishing pressures from increased population has also been addressed. Since hunting and fishing effort is regulated and managed by the State of Alaska, any undue pressures on fish and wildlife resources would be assessed by the staff of the Alaska Department of Fish and Game, with recommendations to the respective regulatory boards of Fisheries and Game for changing management policies, if necessary.

3. Physical Environment:

Issue: A number of commenters observed that Shelikof Strait is too dangerous a place for OCS drilling due to high seas, strong winds and currents, seismic activity and proximity to shore.

Sources: Teresa Holm, Carole Demers, Betsey Myrick, Kathie Short, Jody Webb, Julene Schlack, Charlie Renkert, Peter Thielke, Susan Arndt, and Mary Ann Hickey.

Response: While intuitively one might assume that spill likelihood is higher in areas of more severe meteorologic, oceanographic or geohazard conditions, the fact of the matter is that there is no evidence (statistical, or otherwise) to support this assumption. Offshore structures are carefully engineered and safety factored to withstand conditions present in specific areas. Even in the event of a structure failure, other system controls are likely to prevail, thereby further reducing the likelihood of a spill. That is to say, failure of a structure as a result of environmental or other factors does not necessarily result in failure of spill control equipment. In short, there is no apparent relationship between severity of physical conditions and the likelihood of oilspills. On the other hand, the relevance of proximity to shore may relate to oilspill cleanup, but an intuitive evaluation of the function of distance to shore must include the specific transport characteristics of the water column. Such characteristics are considered in the design of oilspill contingency plans prepared prior to exploratory and development operations (see the response in this section to the oilspill cleanup issue).

Issue: The development scenarios for gas production assume pipelines from both Shelikof Strait and lower Cook Inlet to Anchor Point. A direct route for the former would cross the sand wave field in lower Cook Inlet where some sand waves reach 12-meter heights. The hazards along this pipeline route are not specifically discussed in the DEIS or are mitigating measures and alternative pipeline routes.

Source: Office of Marine Pollution Assessment/OCSEAP.

Response: It is not the purpose of a pre-lease EIS to resolve site-specific construction and design considerations on selected development facilities when it has not yet been determined that such facilities would in fact be constructed. At this point in time, there is no reason to assume a pipeline would in fact be placed on the top of a 12-meter sand dune field. The second assumption that has been made in this comment is that pipelines and sand wave or sand dune fields are technologically mutually exclusive. Fortunately, this does not appear to be the case. For example, pipelines criss-cross numerous sand dune fields in west Texas and in the Middle East. Although these are onshore, the nature of drifting sand waves is quite analogous. There are also a number of examples of submarine pipelines crossing sand wave fields in the North Sea. In fact, a considerable amount of scientific research has been published in various countries adjacent to the North Sea on this subject.

In terms of the nature of the sand wave field in lower Cook Inlet, research done by the USGS has shown that the larger dunes appear to be stationary and that only the smaller ripples and thinner layers of sediment are actually in motion on the surface of the sand waves. The stationary nature of these sand waves suggests that if and when industry proposes such a marine pipeline it could be suitably routed through the sand wave field without creating an undue environmental risk as a result. Secondly, it would probably be more than likely that such a marine pipeline would be trenched into the seabed to provide additional protection from bottomfishing gear as well as bottom sediment transport. Therefore, at this time, there appears to be sufficient information available on the subject of sand waves as well as currently available technology on the part of the oil and gas transportation industry to adequately design pipelines for lower Cook Inlet without undue risk to the environment in the process.

Issue: One commenter indicated the FEIS should assess the potential for direct and indirect impacts on (ground water) aquifers that exist on land adjacent to the lease sale area.

Source: U.S. Geological Survey.

Response: The onshore aquifers that have been noted conceivably are limited in geographical extent. Insufficient subsurface well data is available to demonstrate the subject aquifers extend into the offshore area under study. Porosity and permeability are notorious geological factors which can and do change the reservoir properties of aquifers even over a relatively short distance. Thus, it appears unlikely that the exact same aquifers onshore on the Kenai and Alaska Peninsulas would exist in a similar form beneath the proposed lease sale area.

In addition, the drilling of wells on the OCS is regulated by the operating orders of the USGS. These orders provide for the appropriate design of the casing of either exploratory or production wells in such a manner that even if an aquifer were encountered, the impact on it would be negligible. Furthermore, fluid discharges from exploratory or production wells are not permitted by the USGS to be pumped back into a freshwater aquifer. Therefore, the likelihood of contaminating a freshwater aquifer from the Alaska Peninsula or the Kenai Peninsula is extremely unlikely.

4. Coastal Zone Management:

Issue: Comments were received from a number of sources requesting a delay of sale pending completion of the Coastal Management Program for the Kodiak Island Borough. A number of reasons were given for this, including 1) plans such as this should guide decisions as opposed to being written after the fact, 2) plans must be completed prior to the lease sale for the exercise of consistency review, 3) plans that contain sanctuary proposals can only be exercised if in approved form, 4) plans in place will allow a more effective analysis of cumulative effects, and 5) the FEIS should fully portray the State and Borough positions relative to Federal consistency with every lease sale decision.

Sources: State of Alaska, Kodiak Island Borough, Kodiak Island Borough OCS Advisory Council, Friends of the Earth, NOAA, Trustees for Alaska.

The specific issues raised on Coastal Zone Management are responded to as follows:

1. It is essential that planning efforts, such as the Coastal Zone Management Program, guide basic oil development decisions, rather than plans being written after the fact to reflect oil development decisions previously made.

Response: The Alaska Coastal Management Program (ACMP), as well as any district program approved thereafter, will guide and influence oil development decisions to the extent permissible under State and Federal law. The proposed OCS sale 60 development and production operations will be subject to a mandatory consistency review determination with the approved ACMP and Kodiak Island Borough CMP pursuant to provisions in the Federal Coastal Zone Management Act (CZMA) as amended. The Federal CZMA and the State ACMP acknowledge the critical role which coastal energy facilities play in supplying state and national energy needs. Explicit provisions have been included in both the Federal CZMA and the State ACMP that the siting of such energy facilities will not be unreasonably restricted or arbitrarily excluded. Thus, the influence which a local CMP and the State ACMP has on oil development decisions is constrained by reasonable consideration of state and national interests.

2. OCS sale 60 should be delayed to allow for completion of the Kodiak Island Borough CMP, and the Borough's exercise of its consistency review authority under the Federal CZMA.

Response: Please refer to section IV.A.2.n. of the FEIS. In addition, the following responses are appropriate: There is no provision in the Outer Continental Shelf Lands Act, or the Federal Coastal Zone Management Act, requiring delay of a scheduled OCS lease sale for a local CMP to be developed as authorized under the Federal CZMA. In the annual review of the OCS program, the Secretary of the Interior is required to consider the effects of the 5-year OCS oil and gas leasing schedule on the Coastal Zone Management program and the policies of affected states, including state coastal management policies.

An EIS was prepared on the proposed 1980-1985 5-year OCS oil and gas leasing schedule. In this assessment, the DOI considered the timing of proposed OCS sales in Alaska with the development and implementation of the state ACMP. For incorporated governments, the ACMP requires local CMP's to be adopted by December 1981. This date should provide sufficient lead time in the context of OCS sale 60 post-sale development. Any necessary consistency reviews on proposed OCS sale 60 will be performed by the State of Alaska in response to the proposed notice of sale on OCS sale 60. The Kodiak Island Borough may forward its CZMA consistency concerns to the State of Alaska in reviewing the proposed OCS notice of sale if its CMP is not authorized at that time.

3. A "Kodiak Coastal Marine Sanctuary," which includes the coastal zone area in Shelikof Strait, has been proposed as an "Area Meriting Special Attention" (AMSA), which can only have an affect on the OCS decision to lease if the coastal zone planning process is much further ahead of leasing than is true in the case of the Shelikof Strait blocks.

Response: With regard to the "Kodiak Coastal Marine Sanctuary" AMSA proposal, this classification was made by the State Office of Coastal Management after an earlier NOAA proposal for marine sanctuary nominations under the Marine Protection, Research, and Sanctuaries Act. The AMSA proposal has not been delineated by any work program, proposed management plan, or any other means beyond an abstract statement. Therefore, it is speculative to assess impacts which the OCS leasing proposal would have on this AMSA abstract as well as other AMSA abstracts which have yet to be defined.

The OCS sale is not the only governmental decision regarding OCS operations. Refer to the discussion in section IV.A.2.n. Moreover, in the absense of an approved AMSA or a local CMP, the State of Alaska has the opportunity to submit comments on mitigating measures, the OCS lease stipulations, the notice to lessee provisions in the proposed OCS Notice of Sale, and the consistency of permit plans. These activities by the State reflect concerns for the coastal habitat areas which would be otherwise managed under an AMSA designation. Again, such specific Coastal Zone practices are better reviewed against OCS operations and post-sale decisions which are more site-specific in nature and hence can be better compared against the site-specific management practices.

4. The discussion of cumulative effects on Coastal Zone Management is unsatisfactory, and the statement that the CMP's will not be adversely affected and that cumulative effects are difficult to identify in the absence of an approved CMP are inconsistent. Moreover, the inability to perform cumulative effects assessment because of the absence of a local coastal management program further demonstrates a need for a delay of sale.

Response: The first paragraph regarding cumulative effects on page 229 of the DEIS has been clarified. The intent was to indicate that a combination of factors renders cumulative impact assessment upon the State ACMP and the districts' CMP speculative at this time. No cumulative effects can be definitely identified at this time. When future proposals become more tangible and local CMP policies regarding siting of development and permissible uses of the coastal zone become articulated, then cumulative effects assessment should reveal more useful findings. Though proposals are presently imprecise and district CMP's are not adopted, these factors are not an acceptable rationale under NEPA, CZMA, or OCSLAA for delaying proposed OCS sale 60.

5. The EIS does not adequately describe the relationship between the ACMP and the proposed lease sale. The EIS should fully portray the State and Borough positions relative to Federal consistency with every lease sale decision.

Response: The State of Alaska has expressed positions on pre-OCS lease sale consistency with the provisions of the approved ACMP. The Kodiak Island Borough has separately expressed concerns about consistency review. However, the Borough's CMP has yet to be approved by the State of Alaska.

The DEIS and FEIS do not fully portray State and Borough positions relative to Federal consistency with pre-lease sale decisions because these are legal or policy issues outside the scope of the EIS. The environmental assessment done for proposed actions under requirements of NEPA and CEQ regulations do not require discussion of legal or policy issues per se. The State of Alaska and its political subdivisions may express their views on consistency through the consistency determinations made by DOI and other Federal agencies (15 CFR 930; 44 FR 37142). For DOI pre-lease activities "directly affecting the coastal zone," DOI will send a notice of determination to the State of Alaska (15 CFR 930.34(a)). The State of Alaska and approved District Coastal Management Programs thereof have the opportunity to "inform the DOI of its agreement or disagreement with the Federal agency consistency determination (15 CFR 930.41(a))."

Further details on the consistency review procedures as these apply to DOI OCS leasing, post-sale permitting, and plan approval are provided in the Federal Office of Coastal Zone Management rulemaking on this subject (15 CFR 930).

5. Air and Water Quality:

Issue: Technical comments regarding the accuracy and adequacy of the air quality assessment were offered. These pertain to such factors as the validity of sampled OCS emission sources, the suitability of the air quality modelling utilized, and the validity of meteorologic data used.

Source: U.S. Geological Survey.

Response: Offshore emission sources from proposed OCS sale 60 are not considered to significantly affect onshore air quality for the reasons stated in the text of the EIS. The text of section IV.A.2.p.-1 has been amplified to respond to specific technical points.

The air quality assessment uses a Gaussian dispersion model with the best data available at the time of EIS preparation. The wind data are derived from OCSEAP sponsored research at sampling stations in lower Cook Inlet waters. The selection of high winds was considered to be part of an extreme case analysis to carry contaminants to shore; otherwise, low wind speeds with the simulated emission volume would probably not yield significant onshore air quality concentrations.

Issue: Comments and supportive evidence were submitted on both sides of the issue whether adverse effects will result from the discharge of drilling fluids (muds and cuttings) and formation waters, comments directed toward determining the need for a mitigating measure to assure high standards of water quality. Contentions pro and con were directed to the effects of discharges into shallow waters, waters with limited circulation or mixing, or waters containing high concentrations of eggs or sensitive juvenile organisms.

Sources: Kodiak Island Borough OCS Advisory Council, AOGA.

Response: The disposal of drilling fluids or formation waters during OCS operations should not pose significant impacts on beneficial uses of marine receiving waters in lower Cook Inlet and Shelikof Strait. The findings of acute toxicity of drilling fluid constituents are not questioned. However, the major consideration in this issue is the mixing, dilution, and transport of wastewater contaminants in receiving waters. Refer to table IV.A.2.o.-1 of the FEIS, which shows that background concentrations of suspended solids were achieved within 100 to 200 meters of mud discharges in the lower Cook Inlet COST Well study (Dames and Moore, 1978). The ocean conditions of concern should not be present in the OCS blocks subject to lease in proposed sale 60. The blocks are clearly not situated in shallow waters, and the prevailing tidal flux would definitely result in mixing and circulation of the receiving water mass.

As to the presence of larval stages of significant species, it should be emphasized that a) only a few exploratory wells will be drilled each year during the exploration phase, b) no more than two wells would likely be drilled at any one time (from two different tracts in the lease sale area), c) the discharge plume yields toxic and sublethal concentrations only in a localized area around each drilling vessel, d) the age class of larval and juvenile organisms is staggered over time so their vulnerability at any one time will be limited, and e) the spatial surface area distribution of larval and juvenile organisms will be enormous in comparison to the toxic area of discharge plumes from individual OCS exploration drilling vessels.

With regard to proposed mitigating measures, an additional level of protection (beyond existing measures) is not warranted in context of available evidence about negligible concentrations of drilling fluid contaminants in marine receiving waters. The Environmental Protection Agency is the final permitting authority for wastewater discharges into marine receiving waters. The OCS Operating Orders recognize EPA's National Pollution Discharge Elimination System (NPDES) authority and defer to it in issuance of Geological Survey permits to drill. The EPA presently relies on available information and expertise of resource agencies in determining allowable fluid discharges from OCS operations. The present permitting conditions take notice of larval reproduction and larval growth seasons of commercially important species through mandated dilution rates of drilling fluids upon discharge (40 bbl water: 1 bbl mud) and maximum discharge volume (25 bbl/hr mud).

Issue: A commenter suggested that existing permitting processes should be used to control the short-term and cumulative effects of contaminant discharges.

Source: Kodiak Island Borough.

Response: The avoidability of the above-mentioned effects ensuing from the lease sale is mentioned in context of the CEQ regulations requiring the identification of unavoidable and adverse effects. However, the short-term and cumulative water quality effects from drilling fluids and produced water discharges are not considered to be adverse. Refer to the text on water quality impacts. The section on unavoidable adverse effects has been clarified to indicate there is no evidence to support a finding of probable adverse effects from cumulative wastewater discharges in OCS operations.

6. Worst Case Analysis:

Issue: The subject of worst case analysis was raised by a number of sources, from different perspectives. Industry portrayed the EIS as a "worst case" analysis, since the basis for the oilspill risk analysis did not account for new technology, new regulations, and proven Cook Inlet experience. It was felt that if these factors were taken into account, then most all of the stated biological impacts should be reduced. On the other hand, it was felt the worst case analysis contained in the EIS was deficient in not covering resources other than endangered species.

Sources: ARCO, AOGA, Kodiak Island Borough.

Response: The worst case is reserved to analysis where insufficient information exists about a given resource. Other uses of the term connote a severe or exaggerated situation, as in the case of industry comments about not using previous Cook Inlet experience in the oilspill risk analysis. Please refer to the response to comments on the oilspill risk analysis for a discussion of the basis for the analysis in the context of Cook Inlet experience. This discussion indicates there is little reason to believe the use of Cook Inlet experience would necessarily produce reduced biological impacts as a function of different output from the oilspill risk analysis. Please keep in mind the resource estimates used in the oilspill risk analysis are assumed discovered and produced. The estimates are not risked as to probability of discovery. The amount of assumed resource production, based on this premise, is the mean rather than the high level of resource production used in the "worst case analysis" contained as part of the EIS. The worst case analysis considers the impacts on endangered cetaceans because of insufficient information. Information is considered sufficient for other resources to make a reasoned choice among alternatives.

E. General Issues

Issue: The subject of the need for developing alternate energy sources and for a national concern for energy conservation was raised from a number of sources, several of which criticized the DEIS for not having a substantive discussion of alternate energy sources and failing to assess alternatives other than block deletions.

Sources: Kodiak Island Borough, Friends of the Earth, Carole Demers, Betsey A. Myrick, Julene Schlack, Charlie Renkert, Peter L. Thielke, Susan Arndt, and Peggy McIntyre.

Response: Evaluation of alternative energy sources as possible substitutes for OCS oil development is a programmatic level evaluation of a policy nature. Such evaluation already has been performed several times (see sale 55 FEIS and the FEIS for the 5-year OCS program), resulting in the conclusion that other energy sources are not an alternative to Federal oil and gas leasing under the existing energy crisis and national policy. Federal policy recognizes clearly that all sources are needed. The only practical short-term substitute for oil and gas development is importing. The energy crisis in the United States is brought about by the dependence on oil imports. An increase in imports to substitute for U.S. oil and gas development would only compound the crisis and should not be considered a substitute for such development. Oil development, particularly a single lease sale, is no direct substitute for (or cannot be substituted by) some other energy form. The impracticalities are numerous. The practice of assessing block deletion alternatives to the proposed action is based on specific data and a site-specific area.

Issue: The feeling that onshore areas should be explored and developed before offshore areas are exploited was expressed from a number of sources.

Sources: Kodiak Island Borough, Oliver N. Holm, Sandra Malloy, Derrell R. Short, Kathie Short, Peggy McIntyre.

Response: The Department of the Interior encourages a balanced approach to the exploration and development of onshore as well as offshore federal lands. The OCS oil and gas leasing program operates under a Congressional mandate contained in the OCS Lands Act amendments and is implemented through the 5-year OCS leasing program, of which proposed sale 60 is a part. The OCS oil and gas leasing program is carried out in conjunction with onshore programs mandated by other legislation for the purpose of seeking all possible resources to achieve less dependence on imported energy resources. Energy resources developed from different sources are not necessarily substitutable, as indicated in the discussion of the issue of alternative energy sources. A factor that could contribute to the impression of emphasis being placed on offshore oil and gas resources is that more acreage with oil and gas potential presently is identified under federal jurisdiction offshore than onshore. In Alaska, access to such federal lands onshore was unclear in years past during the Congressional debate over national interest lands in Alaska. The enactment of the Alaska lands legislation may serve to more fully equalize exploration onshore and offshore for oil and gas resources.

Issue: A number of individuals and organizational representatives commented on the adequacy and effectiveness of oilspill containment and cleanup technology. Such technology was considered inadequate for the lease sale area and especially for the Shelikof Strait. Many considered the risk of oilspill damage to vulnerable coastal habitats and marine resources to be increased in the Shelikof Strait because of the severe winds, tidal currents, high seas, potential seismic activity, and the proximity of OCS operations to shore. Some also felt the DEIS section of oilspill response was inadequate in not assessing the time needed for response and the ability to stage a cleanup operation in the Shelikof Strait.

Sources: Friends of the Earth, Environmental Protection Agency, State of Alaska, NOAA, Alaska Chapter of the Sierra Club, Lee Stratton, Oliver N. Holm, Carole Demers, Jody Webb, Julene Schlack, Charlie Renkert, Peter L. Thielke, and Susan Arndt.

Response: The OCSLAA require that the Best Available and Safest Technology (BAST) be used in exploring and developing oil and gas resources in the Outer Continental Shelf. The OCS operating orders of the USGS require evidence to this effect to be submitted by the lessee prior to any drilling operations offshore. The operating orders also require lessees to submit oilspill contingency plans for approval by the USGS prior to drilling operations. The section on oilspill response describes the type of information required in an oilspill contingency plan.

The type of action taken in response to an oilspill event is based on the judgment of those responsible on scene in relation to the specific characteristics of the spill, such as the need for protecting life and property through search and rescue operations, as well as the source, volume, and type of materials spilled; weather and sea conditions; and proximity to vulnerable coastal habitats. Conditions may exist where other priorities delay offshore cleanup, such as the need to stop an OCS oilspill at the source, as covered in the Memorandum of Understanding between USGS and the Coast Guard, or the need to protect human life and property, as in the case of the Lee Wang Zin sinking episode near Ketchikan, Alaska.

The amount and type of cleanup containment equipment available to the Federal On-Scene Coordinator (FOSC) of the Coast Guard is not limited to the inventory in Alaska. The FOSC has access, if necessary and available, to any equipment in the national roster, although some time may be needed to put the equipment in place. For example, the Glacier Queen spill incident in Seldovia Bay in November of 1978, required the mobilization of a 6,000-foot USN Goodyear boom from Stockton, California, after the failure of booms in Alaska due to the strong tidal action. It took 11 days to transport, lay out, and deploy the boom around the Glacier Queen according to the US Coast Guard log of events.

There are conditions of weather, seastate, discharge volume, and geography where oil essentially is unrecoverable at sea. In conditions of 8- to 10-foot seas, it may be unsafe to carry on cleanup operations at sea and very difficult to find the oil, since such energy is generated by wind and waves that the oil becomes churned into the water column (Kazmierczak, 1980). In cases where a large volume of oil is released relatively close to shore, such as in a tanker incident, the salvation of beaches may be favorable winds and currents that take the oil out to sea where it can be dispersed naturally (Vielvoye, 1980).

Although the type of response initiated at a spill site depends on the characteristics of the spill, planning for response action takes into account specific characteristics of the lease sale area and the types and location of equipment needed to mobilize response in such a locale. Equipment inventories, locations, and response times, among others, are cited in the contingency plan for approval as to adequacy by the USGS prior to the beginning of drilling operations. The contingency plan additionally addresses measures for defending the coast and conducting coastal cleanup. Information on coastal vulnerability to oil persistence and on critical coastal habitats is invaluable for contingency planning and as a means of guiding cleanup decisions of the Scientific Support Coordinator and FOSC.

Issue: Several comments were received concerning the compensatory funds established through the OCS Lands Act, as amended. There was concern that the perceived $100,000 limit of liability for the Fishermen's Contingency Fund was inadequate to deal with Alaskan fishermen's financial investment. The point also was made that the liability limit for vessels established in the Offshore Oil Pollution Compensation Fund was inadequate to deal with the cost and recoverable cost of oilspill cleanup operations.

Sources: State of Alaska, Friends of the Earth.

Response: There is not a $100,000 maximum limit of liability in the Fishermen's Contingency Fund. As indicated in the EIS, "each area account can be funded to a maximum of $100,000 and the law specifies procedures for replenishing the account when depleted to less than $50,000." The $100,000 maximum is a maximum for an area account, not a maximum for compensation under the Fishermen's Contingency Fund.

There seems to be some confusion over the source of funds to pay for oilspill cleanup operations. The Offshore Oil Pollution Compensation Fund is not the vehicle to pay for such operations. As indicated in the EIS, there is a National Contingency Fund for cleanup and other removal costs of spills of oil or hazardous substances authorized under the Federal Water Pollution Control Act. This revolving fund is the responsibility of and is managed by the United States Coast Guard. There is no relationship between the Offshore Oil Pollution Compensation Fund and the National Contingency Fund used to pay for cleanup operations. There is also no relationship between the amount recovered from the spiller as a proportion of the total spent for cleanup. The cost of cleanup to the United States Government is the total cost of cleanup, less that which can be recovered from the spiller.

Issue: The introduction of the petroleum industry as a new sector of the Kodiak Island economy is foreseen in one comment as introducing inflationary pressures on villages in the area.

Source: Kodiak Area Native Association.

Response: It is possible that an increased demand for facilities and services by the petroleum industry could have the potential for raising prices for goods and services in the Kodiak Island area. Such increased prices could be brought about not only by an increased external demand, but also by a decreased supply of locally needed goods and services such as could be brought about by diverting ocean and air transportation space for petroleum industry-needed goods. Impacts such as this could take place, but the assumption used in the EIS analysis is that an increased demand for services would be followed by a commensurate increase in the supply of such services. Consequently, an impact of this kind would not be of long duration and would be compensated for through normal economic processes.

Issue: It was noted by a number of sources that a developmental EIS should be required if a commercial discovery is made in the lease sale area.

Sources: State of Alaska, Kodiak Island Borough OCS Advisory Council.

Response: Provisions for requiring a developmental EIS in frontier areas is contained in the OCS Lands Act, as amended. Section 25 of the Act requires that at least once in a frontier area the approval of a development and production plan would be declared a major federal action under NEPA and a draft and final environmental statement would be prepared. The Secretary has the authority by this means to require a developmental EIS should a commercial discovery be made.

Issue: It was pointed out in one comment that the subject of the impacts of onshore development on Afognak and Ban Islands should take into consideration the existing withdrawals under section 204(b)(1) of the Federal Land Policy and Management Act of 1976 (PL 94-579) and the legislation on National Interest Lands pending before the U.S. Congress.

Source: U.S. Forest Service.

Response: Subsequent to the preparation of this comment, the U.S. Congress passed and the President signed the Alaska National Interest Lands Act. From the best information at hand, it is not evident that any significant part of the Kodiak Island Archipelago has been placed into the wilderness preservation system. Regardless, the EIS shows little or no impacts to Afognak or Ban Islands from onshore development. Under the scenarios used to evaluate the respective alternatives, potential onshore impacts from land development are considered primarily at Port Lions, and secondarily, in the city of Kodiak. The source of the comment is advised to continue monitoring for potential onshore effects should a commercial find of hydrocarbons result from exploration in the lease sale area. It is at this time that specific negotiations could take place for the siting of onshore development, subject to appropriate regulations.

Issue: It was requested in one comment that the current status of west coast LNG receiving facilities be clarified in the FEIS.

Source: Federal Energy Regulatory Commission.

Response: The body of the text on transportation has been changed to reflect the current status of west coast LNG receiving facilities.

Issue: One individual indicated the DEIS was of relatively little value for predicting social impacts, indicating the authors were practicing faulty social science.

Source: Alaska Resources International.

Response: The EIS is not a research document but is written in compliance with the Council on Environmental Quality regulations governing environmental impact assessment (40 CFR 1500). The BLM-sponsored Socioeconomic Studies Program contracts for research in the geographic area potentially subject to impact from OCS lease sales. The emphasis in EIS preparation is on analysis using this reserach and all other available information.

Issue: One comment indicated justification must be provided for identifying blocks in graphic 13 as requiring special cultural resource surveys.

Source: AOGA.

Response: The blocks are identified as having the potential for containing cultural resources, as indicated by the studies referenced of Dixon, Sharma, and Stoker. The discussion of the cultural resources mitigating measure explains procedures for determining whether special surveys are indeed required.

Issue: One commenter suggested that circulation of the DEIS for comment did not fulfill this agency's responsibilities under Section 106 of the National Historic Preservation Act of 1966.

Source: Advisory Council on Historic Preservation.

Response: The Department of the Interior believes that the Environmental Impact Statement prepared for this proposed lease sale contains an adequate treatment of the potential impacts on archeological and historical resources and measures which will effectively mitigate any potential adverse effects. The OCS leasing process is a multi-staged one and includes a number of decision points beyond the lease sale decision. Decision points on the approval of exploration plans or production and development plans are considered more appropriate times to conduct necessary consultation and make more specific determinations as to possible adverse impacts. The Department has devoted considerable effort in order to develop and implement measures which will ensure the protection of cultural resources from the impacts associated with OCS oil and gas activities. Additionally, we anticipate that in the upcoming months we will be working closely with the Advisory Council on Historic Preservation in developing counterpart regulations which will clearly define the process necessary for compliance with the National Historic Preservation Act.

F. Public Hearings and Comments

Public hearings were held on the draft Environmental Impact Statement during the week of October 12, 1980, in Homer, Kodiak, and Anchorage, Alaska. A listening meeting also was carried out in Port Lions, Alaska, during the same period. A total of 115 persons testified at the public hearings and at the listening meeting. The following is a list of all persons that testified.

Homer Public Hearing

October 14, 1980

Name	Home/Affiliation
Ken Bloom	Kachemak Bay Conservation Society
Virginia de Vries	Homer, Alaska
David Hoopes	Kodiak Island Borough
Thomas Peterson	Kodiak Island Borough OCS Advisory Council
Steven Smiley	Homer, Alaska
Nancy Lord	Homer, Alaska
George Ripley	Homer, Alaska
Carlos Freeman	Homer, Alaska
Georgia Linnea Hodge	Homer, Alaska
Ray W. Hodge	Homer, Alaska
Greg Demers	Homer, Alaska
Joy Post	Homer, Alaska
Dean Heusel	Homer, Alaska
Bob Schiro	Homer, Alaska
Lawrence Nevitt	Homer, Alaska
Yule Kilcher	Homer, Alaska
Diane Spencer	Homer, Alaska
Richard Knowles	Atlantic Richfield Company
Reuben Call	Homer, Alaska
Jan Needham	Homer, Alaska
Joel Gay	Homer, Alaska
Patty Yancey	Homer, Alaska
Don Dumm	Homer, Alaska
Phillip Brudie	Homer, Alaska
Julie Cesarini	Homer, Alaska
Gail Phillips	President, Homer Chamber of Commerce
Angelo Phillips	Homer Chamber of Commerce
James Herbert (for Bill Bledsoe and Bob Tremain)	Homer, Alaska
Steven M. Clark	Homer, Alaska
Michael S. O'Meara	Homer, Alaska
Janet O'Meara	Homer, Alaska
Peggy McIntyre	Homer, Alaska
Danny Parks	Homer, Alaska
Frank S. Griswold	Glacier View Garage
Robert E. Barnett	Homer, Alaska
Beth Cumming	Homer, Alaska
Joyce Dey	Homer, Alaska
Christopher Skelly	Homer, Alaska
Arnold Melsheimer	English Bay, Alaska
Lee Stratton	The North Pacific Rim
Keven Hogan	Homer, Alaska
Bill Osborne	Kodiak Area Native Association
Marilyn Hammond	Homer, Alaska

Asaiah Bates	Homer, Alaska
Laura Barton	Homer, Alaska
Paul Folley	Homer, Alaska
Leslie Hafemeister	Homer, Alaska
Roseleen Moore	North Pacific Fisheries Association
Eric Ranger	Homer, Alaska
Michael McBride	Kachemak Bay Wilderness Lodge
Jeff Springette	Homer, Alaska
Robin Ziperman	Homer, Alaska
Camdon Wall	Homer, Alaska
Robert Haynes	Homer, Alaska

Kodiak Public Hearing

October 15, 1980

Name	Home/Affiliation
David Hoopes	Kodiak Island Borough
Stacy Studebaker	Kodiak High School
Chris Stone	Kodiak High School
Tony Rickard	Kodiak High School
Tracy Powell	Kodiak High School
Tom Dooley	Kodiak High School
Thomas Peterson	Kodiak Island Borough OCS Advisory Council
Thomas Cook	Chevron U.S.A.
Edward Mertens	Chevron U.S.A.
Forest Blau	Kodiak, Alaska
Stephen Rennell	Kodiak, Alaska
David Wakefield	Port Lions City Council
Chris Myrick	Kodiak, Alaska
Linda Freed	Kodiak Island Borough, Office of Coastal Zone Management
Betsy Myrick	Kodiak, Alaska
Art Panamaroff	Larsen Bay Village Council
Dorothy Pestrikoff	Old Harbor, Alaska/KANA OEDP Committee
Wayne Marshall	Kodiak Area Native Association
Bill Osborne	Kodiak Area Native Association
Laura Bartels	Kodiak Area Native Association
Theresa Holm	Whale Island, Kodiak, Alaska
Peter Holm	Kodiak, Alaska
Richard Knowles	Atlantic Richfield Company
Dave Thompson	Kodiak, Alaska
Bruce Baker	Office of the Governor, State of Alaska
John Joskoski	Kodiak, Alaska
Hank Pennington	Kodiak Island Borough OCS Advisory Council
Barbara Monkeiwicz	Kodiak, Alaska
Kathy Short	Kodiak, Alaska
Derrell Short	Kodiak, Alaska
David Herrnstein	Acting Mayor, Kodiak Island Borough
Dawn Lea Black	Kodiak, Alaska
David Kubiak	Kodiak, Alaska
Alvin Burch	Kodiak Island Borough OCS Advisory Council
Chuck Karpinski	Kodiak, Alaska
Nancy Johnston	Kodiak, Alaska

Anchorage Public Hearing

October 16, 1980

Name	Home/Affiliation
Dieter Wuerth	Alaska Resources International
Robert Rasmussen	Pile Drivers and Divers Local 2520
David Hoopes	Kodiak Island Borough
James Sumner	Indian, Alaska
Margie Gibson	Friends of the Earth
Ron Zobel	Trustees for Alaska
Peg Tileston	Alaska Center for the Environment
Mary Ellen Spencer	Anchorage, Alaska
William Meyers	Alaska Oil and Gas Association
Thomas Cook	Chevron, U.S.A.
Leonard Darsow	Alaska Oil and Gas Association; Amoco Production Company
Loren Gordon	Cook Inlet Response Organization
Lee Stratton	The North Pacific Rim
Patricia Petrovelli	Rural Alaska Community Action Program
Don Gilman	Mayor, Kenai Peninsula Borough
Paul Lowe	Alaska Chapter of the Sierra Club
David Benton	Friends of the Earth
Edward Mertens	Chevron, U.S.A.

Port Lions Listening Meeting

October 16, 1980

Name	Home/Affiliation
Fred Johns	Port Lions, Alaska
Jim Calhoun	Port Lions, Alaska
Dave Wakefield	Port Lions City Clerk
Roger Liebner	Port Lions, Alaska
Jan Emmick	Port Lions, Alaska
Pat Lukin	Mayor, Port Lions, Alaska

Public Comments: Public comments were received from 51 sources from government, organizations, and individuals. The following is a list of all sources of comments received.

Government

Federal

Department of Agriculture Forest Service	John A. Sandor
Department of Commerce Maritime Administration Office of Shipbuilding Costs	Kenneth W. Forbes

National Oceanic and Atmospheric Administration	Michael Glazer
Office of Coastal Zone Management	
National Marine Fisheries Service	
Outer Continental Shelf Environmental Assessment Program	
Pacific Marine Environmental Laboratory	
Office of Oceanic and Atmospheric Services	
Department of the Interior	
Fish and Wildlife Service	Associate Director
Geological Survey	H. William Menard
Heritage Conservation and Recreation Service	Harold Green
Department of Transportation	
Coast Guard	W. R. Reidel
Federal Aviation Administration	Frank Austin
Environmental Protection Agency	William N. Hedeman, Jr.
Advisory Council on Historic Preservation	Louis S. Wall
Federal Energy Regulatory Commission	Kenneth A. Williams
Marine Mammal Commission	John R. Twiss, Jr.
State	
State of Alaska	Frances A. Ulmer
Local	
Kodiak Island Borough	David Herrnstein
City of Homer	Wm. S. Bunselmeyer, TAMS
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Alaska Center for the Environment	Peg Tileston, Executive Director
Sierra Club, Alaska Chapter	Paul Lowe, Chair
Alaska Oil and Gas Association	William W. Hopkins, Executive Director
ARCO Oil and Gas Company, a division of Atlantic Richfield Company	G. T. Wilkinson, Vice President
Liskow and Lewis, Attorneys at Law, for the Alaska Oil and Gas Association	William M. Meyers
Kodiak Area Native Association	Ione M. Norton, President, by Wayne E. Marshall

Individuals

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B. List of Contacts for Preparation of the Final Environmental Impact Statement

A number of Federal, State, and local government agencies, academic institutions, industrial firms, and special interest groups were consulted prior to and during the preparation of this final environmental impact statement (FEIS). Agencies and groups which were contacted for information or input are included in, but not limited to, the following list:

Federal:

- Department of Agriculture
    - Forest Service
- Department of Commerce
    - National Oceanic and Atmospheric Administration
        - National Marine Fisheries Service-Juneau, Seattle, and Kodiak
- Department of Defense
    - Air Force - Daniel F. Eckert, C.E.
    - Army Corps of Engineers
- Department of the Interior
    - Bureau of Land Management
        - Division of Alaska Native Claims Settlement Act Operations
        - Outer Continental Shelf Office-Los Angeles
    - Fish and Wildlife Service-Anchorage, Kodiak, and Kenai
    - Geological Survey
        - Conservation Division
        - Geological Division
        - Water Resources Division
    - National Park Service
- Department of Transportation
    - Coast Guard
- Environmental Protection Agency

State:

- Department of Commerce and Economic Development
    - Alaska Pipeline Commission
    - Alaska Power Authority
- Department of Community and Regional Affairs
- Department of Environmental Conservation
- Department of Fish and Game-Anchorage, Homer, Soldotna, and Kodiak
- Department of Natural Resources
    - Division of Minerals and Energy Management
    - Division of Parks
- Department of Transportation
- Office of the Governor
    - Division of Policy Development and Planning
    - Office of Coastal Management

Local:

- Afognak Native Corporation
- English Bay Village Council
- City of Ouzinkie
- Cook Inlet Native Association
- Cook Inlet Regional Corporation
- Homer City Council
- Karluk Village Council
- Kenai Peninsula Borough Planning Department
- Kodiak Area Native Association

Kodiak Island Borough
    Planning Department
    School District
Kodiak Outer Continental Shelf Advisory Council
Larsen Bay Village Council
Ouzinkie Native Corporation
Port Graham Village Council
Port Lions City Clerk
Port Lions City Council
Port Lions Tribal Council

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Atlantic Richfield Company
Bomhoff Associates
Cook Inlet Pipeline Company
Gulf of Alaska Cleanup Organization, Manager
International Pacific Halibut Commission
Island Corporation
Kenai Pipeline Company
Kodiak Island Seafood, Inc.
North Pacific Fisheries Management Council
North Pacific Rim, Inc.
Pacific Alaska, LNG Company
Pacific Marine Environmental Laboratories
Placer Amex Corporation
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For scoping participants, refer to section I.F.

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APPENDIX A

PETROLEUM DEVELOPMENT SCENARIOS AND BASIC ASSUMPTIONS UTILIZED TO DEVELOP THE ALTERNATIVES INCLUDING THE PROPOSAL

AND

SUMMARY OF IMPACTS FOR THE MINIMUM AND MAXIMUM CASES

Introduction

The following pages present oil and gas development scenarios which describe the proposal, as well as the three alternatives to the proposal. These scenarios form the basis for the following sections: Description of the Alternatives Including the Proposal (secs. II.A. and II.B.), Basic Assumptions Regarding Causes of Possible Impacts Resulting From the Alternatives Including the Proposal (sec. IV.A.I), and Estimation of Direct Employment and Description of Basic Assumptions Utilized (Appendix B).

The mean case of the proposed action is the focus of an environmental analysis throughout this environmental impact statement. For this reason, a description of the mean case will not appear in this appendix. Tables indicating time periods for facility investment and construction will be displayed for all cases.

Exploration Field Development and Production Assumptions: The following exploration and production assumptions were used in constructing the five scenarios portrayed in this EIS. These assumptions are generalized and have application to all scenarios heretofore discussed.

In order for development to be economically feasible, the 95 percent resource level should be discovered in at least one or two fields.

Drilling would occur year-round.

Exploratory drilling would require heavy duty semisubmersibles; however, jack-ups could be used in selected locations. Drillships would probably not be used due to their inability to maintain their location during the violent storms Cook Inlet and Shelikof Strait experience.

Each exploratory well is assumed to require an average of 180 days to complete.

The average vertical depth of an exploratory well will be 16,000 feet. For production wells the average depth will be 10,000 feet.

Marine support activities for the exploratory phase of OCS activity would be launched initially from existing facilities at Nikiski, and future facilities at Homer. No marine support activities are seen to come from Chiniak Bay.

Air support for lease sale 60 would primarily issue from airfields near the marine support facilities. Some air support during the exploratory phase and most definitely during the developmental phase, would issue from the Port Lions airfield.

The existing industrial infrastructure at Nikiski (excluding Homer) is adequate to support all future sale 60 support activities.

Well workovers may begin in the fifth year of each wells' operation, and proceed on a four- or five-year cycle after that. One workover rig per platform would do the work.

One service well for every four production wells will be drilled.

One rig per production platform (though not necessarily the same rig) would accomplish all production-related drilling.

The type of production platform which would be emplaced in the Cook Inlet/Shelikof Strait lease area would be determined on site-specific criteria. Several platform types could be employed: guyed tower, catenary, and tension-leg. However, the type of platform most probably used will be a pile-driven steel tower engineered for the rigorous requirements of the sale area. The platforms would be built on the U.S. west coast or in Japan, and would be towed to the drill site. Platform crews for operation onboard at any one time would peak at:

Minimum Case	100 persons
Mean Case	170 persons
Maximum Case	222 persons

Offshore production facilities inadequate for the sale area are subsea completions, gravel islands, and steel and/or concrete gravity structures.

No platforms would be strictly utilized for pipeline systems.

Oil production for the northern portion of the sale area would be pipelined directly to an oil storage facility located in the Anchor Point/Stariski Creek area. Oil from the Shelikof Strait would be pipelined through the Kupreanof Straits to Chernof Point, and then overland to an oil storage terminal located near Talnik Point. The size of these terminals would range from 120-170 acres each.

*Due to the climate of the Kizhuyak-Marmot Bay area, the Talnik Point facility would probably require a breakwater.

All gas production would be pipelined to Anchor Point and the overland to an existing LNG facility located at Nikiski.

Storage facilities at all terminals would equal five to ten days of production; most probably six days.

Gas production would probably be treated on the platforms and pipelined to shore. Any gas condensates will probably be reinjected into the formation.

All gas produced is assumed to be associated gas.

There would be no onshore oil booster stations. There may be one 40 acre gas compressor station located in the Stariski Creek/Anchor Point area.

Oil pipeline diameters will range from 18 to 26 inches, with 22 inch used in the mean case. Gas pipeline will range from 10 to 26 inches with 18 inch used in the mean case.

No offshore pipeline laying problems are anticipated. Pipeline burial disturbance would equal between 4,000 and 6,000 yds.^{3} with 5,000 yds.^{3} judged to be applicable for the mean case.

The price of the produced LNG delivered to California would, in the mean case, amount to approximately \$5-\$7 per Mcf. This figure represents approximately \$2-\$3 for the cost of production and \$3-\$4 for the cost of shipment.

The wellhead price for oil (given world conditions at the time of preparation of this draft) would equal \$25-\$30 per barrel. The price delivered to the west coast of the United States would run some \$28-\$32 per barrel.

Supply boats and helicopters would move supplies and personnel between shore and platforms. The combined air and water fleet would range between 3-4 units per platform. The fleet size is dependent on the phase of OCS activity. During a later period of production, the fleet size may decrease to one to two units for every two platforms.

Onshore pipeline, on the Kenai Peninsula and on Kodiak could be laid at 2 miles per day.

Offshore barges vary in their ability to lay pipeline. Depending on climate and length of the laying season a barge can emplace 50-75 miles of pipe in a season.

Standard pipe lay barges can operate in wave heights up to 5 feet. As the weather throughout the proposed sale area is generally inclement, it is probable that larger lay barges, such as the "Viking Piper," will be used in order to minimize downtime.

Exploration wells (16,000 ft depth) would require up to 1,050 tons of crushed rock material to be used for drilling mud. Of that tonnage, at least 825 tons would be barite. Exploratory wells would also require up to 525 tons of cement and produce approximately 375 yds.^{3} of drill cuttings.

Production wells (10,000 ft depth) would require up to 750 tons of crushed rock material to be used for drilling mud. Of that tonnage, at least 600 tons would be barite. Production wells would also require up to 370 tons of cement and produce approximately 270 yds.^{3} of drill cuttings.

As the nature of the geological formations of the Shelikof Strait area is only partially known, it is difficult to estimate the amount of formation water which may be contained in the hydrocarbon reservoirs. Figures gleaned from the production statistics of the upper Cook Inlet oilfield indicate that as of 1978 one barrel of formation water was being produced for every two barrels of oil.

Estimated Activity Based on the 95 Percent (Minimum) Scenario: Exploration is expected to begin in 1982 and continue through 1986 with a total 11 exploration and delineation wells drilled. No more than two drill rigs are assumed to be working during any year. Jack-up rigs could be used in favored locations; however, given the area's strong currents and deep water, semisubmersibles would be employed in most cases.

If initiated, the development phase would begin in 1985 with the installation of a pile-driven steel tower platform. In 1986, the second of the two platforms forecast for this scenario, would be emplaced. By 1989, some 96 production and service wells would be drilled. Full production would begin in 1986 with a peak production of 55.3 MMbbls of oil and 96.8 Bcf of gas occurring in 1990.

Pipeline construction would begin in 1985 and continue through 1988. A total of 230 miles of gas and oil pipe would be emplaced by either a reel or lay barge. See table A-6 for a breakdown.

Oil and gas production is expected to begin in 1987 with oil production ceasing in 2009 and gas in 2010. The total life of the field is expected to be 23 years.

Pipeline diameters utilized for oil transport would be 18 inches for oil and 10 inches for gas.

The facility construction scenario for the minimum case closely parallels that which was outlined for Alternative V. The minimum case scenario stipulates the location of a small hydrocarbon reservoir in the lower Cook Inlet.

Approximately 160 miles of offshore oil and gas pipe would be constructed to a landfall located between Stariski Creek and Anchor Point. At the landfall, an oil storage terminal would be constructed. The terminal would be approximately 100 acres in size, and would contain: loading facilities for tankers of the 100,000 dwt class, ballast water treatment facilities, reservoir tanks, and a small gas compressor station. Oil storage tanks should have a total capacity of between 400,000 and 600,000 barrels of oil.

From the oil storage/transportation facility, natural gas would be piped 70 miles overland (along the coast) to the Kenai/Nikiski area. At that point the gas would be liquefied at either the existing Phillips LNG plant or the proposed Pacific LNG facility. From Nikiski, the gas would be shipped via LNG tankers to the west coast of the United States.

Marine support activities would be launched from the Kenai/Nikiski area. Existing dock facilities are such that no expansion would be necessary to undertake the volume of activity forecast in the minimum case scenario.

Air support would issue from both the Kenai/Nikiski area as well as the Port Lions airfield.

Due to the development of the upper Cook Inlet and the exploratory activity required by sale CI, many oil companies (Marathon, AMOCO, Union, ARCO) have constructed supply yards and warehouses in the Kenai area. Unless a company, thus far foreign to the Cook Inlet, is involved in a hydrocarbon strike, it is doubtful that any major addition to existing supply facilities will occur.

Estimated Activity Based Upon the 5 Percent (Maximum) Scenario: Exploration is expected to begin in 1982 and continue through 1987 with a total of 28 exploration and delineation wells drilled. A maximum of four drill rigs would be operational during the peak year of exploratory activity (1984). Jack-up rigs could be used in shallow water; however, semisubmersibles are preferable throughout most of the sale area.

If initiated, the development phase would begin in 1985 with the installment of three pile-driven (supported) steel tower platforms. In 1987, the seventh and last of the platforms would be installed. By 1992, some 295 production and service wells would be drilled. Production would begin in 1987 with a peak production of 124.9 million barrels of oil and 218.6 Bcf of gas occurring in 1993.

Oil and gas production is estimated to begin in 1987 with oil production ceasing in 2013 and gas ceasing in 2014. Total life of the field is expected to be 27 years.

Pipeline construction would begin in 1984 and continue through 1987. A total of 435 miles of gas and oil pipe would be emplaced by either a reel or lay barge. See table A-7 for a further discussion.

Standard pipe lay barges can operate in wave heights up to 5 feet. As the weather throughout the proposed sale area is generally inclement, it is probable that larger lay barges, such as the "Viking Piper," will be used in order to minimize downtime.

Pipeline diameters utilized for hydrocarbon transport would be 26 inches for both oil and gas pipe.

The facility construction scenario for the maximum case stipulates the location of large oil and gas reservoirs in both the Cook Inlet and the Shelikof Strait. Two oil terminals would constructed. One would be located in the Stariski Creek/Anchor Point area and the other near Talnik Point on the shores of Marmot Bay.

The oil terminals would occupy about 170 acres each, with the Anchor Point terminal having an additional 40 acres for a gas compressor station. The terminal would contain loading docks (for tankers of the 100,000 dwt class), ballast water treatment facilities, and reservoir tanks. The tanks at each terminal should have the capacity to store up to 900 Mbbls of oil.

The oil pipeline which would be constructed to the Anchor Point facility would pass entirely underwater. The oil pipeline to Talnik Point would pass through the Kupreanof Straits from Shelikof to a landfall at Chernof Point. From the landfall it would reach overland some ten miles to the Talnik Point oil terminal. All gas produced within the Cook Inlet and the Shelikof Strait would be piped to Anchor Point. Once reaching shore at Anchor Point, the gas pipe would travel overland to the LNG plant(s) located at Nikiski.

Gas and oil resources would be split evenly between the facilities located on the Kenai Peninsula and those located on Kodiak. Each group would receive 500 MMbbls of oil and 900 Bcf of gas over the life of the field.

Marine support for all phases of OCS activity would be launched from the Kenai/Nikiski area. Existing Nikiski dock facilities would be adequate during the production phase of OCS activities; however, some expansion would be necessary to meet logistics requirements during the exploratory drilling stage.

Air support would issue from both the Kenai/Nikiski area as well as Port Lions on Kodiak Island.

Due to the development of the upper Cook Inlet and the exploratory activity required by sale CI, many oil companies (Marathon, Union, AMOCO, ARCO, etc.) have constructed supply yards and warehouses in the Kenai area. The full import of the maximum development scenario may cause some expansion (amount unknown) to existing supply facilities within the Kenai area. However, unless a company, thus far foreign to the Cook Inlet is involved in a hydrocarbon strike, it is doubtful that any major addition to existing supply facilities will occur.

Table A-1
Lower Cook Inlet/Shelikof Strait
95 Percent Scenario (Minimum Case)
Estimated Development Scenario and Schedule of Investment and Production

Year	Exploration and Delination Wells			Platforms and Equipment		Production and Service Wells			Workover Wells 6/		Onshore Support	Supply Facilities	Trunk Pipelines		Terminals		Total	Operating	Oil	Gas
	No.	Cost 2/	Rigs	No.	Cost 3/	No. 4/	Cost 5/	Rigs	No.	Rigs	No. 7/	Cost 8/	Miles	Cost 9/	No. 10/	Cost 11/	Investment	Cost	MMbbls	Bcf
1981	Sale-September 1981																			
1982	1	10.9	1								2	22.4					33.3	0.2		
1983	3 1/	32.7	2														32.7	0.2		
1984	4 1/	43.6	2														43.6	0.2		
1985	2	21.8	2	1	302.7								135	373			697.5	0.2		
1986	1	10.9	1	1	302.7	16	59.2	2					65	179	1	302.7	854.5	0.2		
1987						24	88.8	2					30	83			171.8	6.7	7.6	13.3
1988						28	103.6	2									103.6	24.6	28.0	49.0
1989						28	103.6	2									103.6	43.4	48.8	85.3
1990																		50.2	55.3	96.8
1991									18	2								44.3	47.3	82.8
1992									18	2								35.2	35.8	62.5
1993									18	2								28.2	27.0	47.2
1994									18	2								23.0	20.4	35.7
1995									18	2								19.1	15.4	27.0
1996									18	2								16.1	11.7	20.4
1997									18	2								13.8	8.8	15.4
1998									18	2								12.1	6.7	11.7
1999									18	2								10.8	5.0	8.8
2000									18	2								9.9	3.8	6.7
2001									18	2								9.1	2.9	5.0
2002									18	2								8.6	2.2	3.8
2003									18	2								8.2	1.6	2.9
2004									18	2								7.8	1.2	2.2
2005									18	2								7.6	0.9	1.6
2006									15	2								7.4	0.7	1.2
2007									13	2								6.6	0.5	0.9
2008									10	2								4.6	0.3	0.5
2009																		2.2	0.1	0.2
2010																		0.5	-0-	0.1
Total	11	119.9		2	605.4	96	355.2		308			22.4	230	635	1	302.7	2,040.6	401.0	332.0	581.0
												Average Annual Production							14.4	24.2
												Peak Production (Mbbls/d and MMcf/d)							151.5	265.2

All costs are "as installed" in millions of 1979 dollars.
Source: USDI 1979a; Alaska OCS Office, 1979;

Note: Footnotes for all tables are listed on separate sheets at end of all tables.

Table A-2
Lower Cook Inlet/Shelikof Strait
Mean Scenario (Alternative 1)
Estimated Development Scenario and Schedule of Investment and Production

	Exploration and Delination Wells			Platforms and Equipment		Production and Service Wells			Workover Wells 6/		Onshore Support	Supply Facilities	Trunk Pipelines		Terminals		Total	Operating	Oil	Gas
Year	No.	Cost 2/	Rigs	No.	Cost 3/	No. 4/	Cost 5/	Rigs	No.	Rigs	No. 7/	Cost 8/	Miles	Cost 9/	No. 10/	Cost 11/	Investment	Cost	MMbbls	Bcf
1981	Sale-September 1981										2	22.4					53.6	0.2		
1982	3	31.2	2														41.6	0.2		
1983	4 1/	41.6	3														41.6	0.2		
1984	4 1/	41.6	3										145	545			878.9	0.2		
1985	3	31.2	2	1	302.7								190	714.2	2	605.4	2014.8	0.2		
1986	2	20.8	1	2	605.4	26	96.2	2					65	245			703.3	6.6	7.6	13.3
1987				1	302.7	42	155.4	4									155.4	24.7	28.1	49.1
1988						42	155.4	4									155.4	50.4	56.6	99.1
1989						42	155.4	4									155.4	75.4	83.9	146.8
1990						42	155.4	4									3.7	88.5	96.8	169.5
1991						1	3.7	1	35	4								86.3	91.9	160.9
1992									35	4								73.4	75.1	131.4
1993									35	4								58.9	56.8	99.4
1994									35	4								47.9	42.9	75.1
1995									35	4								39.6	32.4	56.8
1996									35	4								33.4	24.5	42.9
1997									35	4								28.6	18.5	32.5
1998									35	4								25.0	14.0	24.5
1999									35	4								22.3	10.6	18.5
2000									35	4								20.3	8.0	14.0
2001									35	4								18.7	6.1	10.6
2002									35	4								17.5	4.6	8.0
2003									35	4								16.6	3.5	6.1
2004									35	4								16.0	2.6	4.6
2005									35	4								15.5	2.0	3.5
2006									30	4								14.4	1.5	2.6
2007									25	4								12.2	1.0	1.8
2008									20	4								8.9	0.6	1.1
2009									12	3								5.2	0.3	0.6
2010									12	2								2.2	0.1	0.2
2011																		0.5	-0-	0.1
2012																				
Total	16	166.4		4	1,210.8	195	721.5		624		2	22.4	400	1,504	2	605.4	4,230.5	810.0	670.0	1173.0
												Average Annual Production							26.8	45.1
												Peak Production (Mbbls/d and MMcf/d)							265.2	464.4

All costs are "as installed" in millions of 1979 dollars.
Source: USDI 1979a; Alaska OCS Office, 1979;

Table A-3
Lower Cook Inlet/Shelikof Strait
5 Percent Scenario (Maximum Case)
Estimated Development Scenario and Schedule of Investment and Production

Year	Exploration and Delinating Wells No.	Exploration and Delinating Wells Cost 2/	Exploration and Delinating Wells Rigs	Platforms and Equipment No.	Platforms and Equipment Cost 3/	Production and Service Wells No. 4/	Production and Service Wells Cost 5/	Production and Service Wells Rigs	Workover Wells 6/ No.	Workover Wells 6/ Rigs	Onshore Supply Support Facilities No. 7/	Onshore Supply Support Facilities Cost 8/	Trunk Pipelines Miles	Trunk Pipelines Cost 9/	Terminals No. 10/	Terminals Cost 11/	Total Investment	Operating Cost	Oil MMbbls	Gas Bcf
1981	Sale-September 1981																			
1982	4	37.6	2								2	22.4					60.0	0.3		
1983	6 1/	56.4	3														56.4	0.3		
1984	9 1/	84.6	4														84.6	0.3		
1985	6 1/	56.4	3	3	908.1								165	620			1584.5	0.3		
1986	2	18.8	2	2	605.4	32	118.4	3					215	808.2	2	605.4	2158.4	0.3		
1987	1	9.4	1	1	302.7	60	222.0	5					20	76.			610.3	6.6	7.6	13.3
1988						60	222.0	6									222.0	24.7	28.1	49.2
1989						60	222.0	6									222.0	50.7	57.1	99.9
1990						53	196.1	5									196.1	76.1	84.8	148.3
1991						16	59.2	2	53	6							59.2	95.9	105.3	184.3
1992						14	51.8	2	53	6							51.8	111.6	120.7	211.3
1993									53	6								117.8	124.9	218.6
1994									53	6								110.6	113.7	199.0
1995									53	6								93.9	92.0	160.9
1996									53	6								76.1	69.5	121.6
1997									53	6								62.6	52.5	91.9
1998									53	6								52.4	39.7	69.4
1999									53	6								44.8	30.0	52.5
2000									53	6								39.0	22.7	39.6
2001									53	6								34.6	17.1	30.0
2002									53	6								31.3	13.0	22.7
2003									53	6								28.8	9.8	17.1
2004									53	6								26.9	7.4	13.0
2005									53	6								25.5	5.6	9.8
2006									45	6								24.4	4.2	7.4
2007									37	6								22.9	3.2	5.5
2008									30	6								20.4	2.3	4.0
2009									15	6								16.8	1.6	2.8
2010									10	4								12.9	1.1	1.9
2011									8	3								9.0	0.7	1.1
2012									4	2								5.3	0.3	0.6

CONTINUED

Table A-3--CONTINUED
Lower Cook Inlet/Shelikof Strait
5 Percent Scenario (Maximum Case)
Estimated Development Scenario and Schedule of Investment and Production

Year	Exploration and Delination Wells			Platforms and Equipment		Production and Service Wells			Workover Wells 6/		Onshore Supply Support Facilities		Trunk Pipelines		Terminals		Total Investment	Operating Cost	Oil MMbbls	Gas Bcf
	No.	Cost 2/	Rigs	No.	Cost 3/	No. 4/	Cost 5/	Rigs	No.	Rigs	No. 7/	Cost 8/	Miles	Cost 9/	No. 10/	Cost 11/				
2013																		2.3	0.1	0.2
2014																		0.6	-0-	0.1
Total	28	263.2		6	1,816.2	295	1,091.5		944		2	22.4	400	1,504	2	605.4	5,407.7	1226.0	1015.0	1776.0
												Average Annual Production							37.6	63.4
												Peak Production (Mbbls/d and MMcf/d)							342.2	598.9

All costs are "as installed" in millions of 1979 dollars.
Source: USDI 1979a; Alaska OCS Office, 1979;

Table A-4
Lower Cook Inlet/Shelikof Strait
Alternative IV
Estimated Development Scenario and Schedule of Investment and Production

Year	Exploration and Delination Wells			Platforms and Equipment		Production and Service Wells			Workover Wells 6/		Onshore Supply Support Facilities		Trunk Pipelines		Terminals		Total	Operating	Oil	Gas
	No.	Cost 2/	Rigs	No.	Cost 3/	No. 4/	Cost 5/	Rigs	No.	Rigs	No. 7/	Cost 8/	Miles	Cost 9/	No. 10/	Cost 11/	Investment	Cost	MMbbls	Bcf
1981	Sale-September 1981																			
1982	2	16.8	2								2	22.4					39.2	0.2		
1983	3 1/	25.2	2														25.2	0.2		
1984	3 1/	25.2	2														25.2	0.2		
1985	2	16.8	1	1	229.9								150	426			672.7	0.2		
1986				1	229.9	18	66.2	2					70	199	1	302.7	798.2	0.2		
1987						28	103.6	2					30	85			188.6	6.6	7.5	13.2
1988						28	103.6	2									103.6	24.4	27.6	48.4
1989						2	7.4	1									7.4	39.1	43.7	76.6
1990																		39.9	43.0	75.4
1991									15	2								32.4	33.9	59.5
1992									15	2								25.8	25.7	45.0
1993									15	2								20.8	19.4	34.1
1994									15	2								17.1	14.7	25.7
1995									15	2								14.2	11.1	19.5
1996									15	2								12.1	8.4	14.7
1997									15	2								10.5	6.3	11.1
1998									15	2								9.2	4.8	8.4
1999									15	2								8.3	3.6	6.4
2000									15	2								7.6	2.7	4.8
2001									15	2								7.1	2.1	3.6
2002									15	2								6.7	1.6	2.8
2003									15	2								6.4	1.2	2.1
2004									15	2								6.2	0.9	1.6
2005									12	2								6.0	0.7	1.2
2006									12	2								5.8	0.5	0.9
2007									8	2								5.1	0.3	0.6
2008									2	1								3.1	0.2	0.3
2009																		1.0	0.1	0.1
2010																		0.1	-0-	-0-
Total	10	84.0		2	459.8	76	281.2		244		2	22.4	250	710	1	302.7	1,860.1	316.5	260.0	456.0
												Average Annual Production							11.3	19.8
												Peak Production (Mbbls/d and MMcf/d)							119.7	209.9

All costs are "as installed" in millions of 1979 dollars.
Source: USDI 1979a; Alaska OCS Office, 1979;

Table A-5
Lower Cook Inlet/Shelikof Strait
Alternative V
Estimated Development Scenario and Schedule of Investment and Production

Year	Exploration and Delination Wells No.	Exploration and Delination Wells Cost 2/	Exploration and Delination Wells Rigs	Platforms and Equipment No.	Platforms and Equipment Cost 3/	Production and Service Wells No. 4/	Production and Service Wells Cost 5/	Production and Service Wells Rigs	Workover Wells 6/ No.	Workover Wells 6/ Rigs	Onshore Support No. 7/	Supply Facilities Cost 8/	Trunk Pipelines Miles	Trunk Pipelines Cost 9/	Terminals No. 10/	Terminals Cost 11/	Total Investment	Operating Cost	Oil MMbbls	Gas Bcf
1981	Sale-September 1981																			
1982	1	9.5	1								2	22.4					31.9	0.2		
1983	2 1/	19.0	2														19.0	0.2		
1984	2	19.0	2														19.0	0.2		
1985	1	9.5	1	1	190.7								135	373			573.2	0.2		
1986				1	190.7	24	88.8	2					65	179	1	201.8	660.3	0.2		
1987						24	88.8	2					30	83			171.8	6.7	7.6	13.3
1988						5	18.5	1									18.5	21.4	24.2	42.5
1989																		29.5	32.8	57.5
1990																		26.5	28.3	49.7
1991									11	2								20.8	21.4	37.6
1992									11	2								16.6	16.2	28.4
1993									11	2								13.5	12.3	21.5
1994									11	2								11.1	9.3	16.3
1995									11	2								9.3	7.0	12.3
1996									11	2								8.0	5.3	9.3
1997									11	2								6.9	4.0	7.0
1998									11	2								6.1	3.0	5.3
1999									11	2								5.6	2.3	4.0
2000									11	2								5.1	1.7	3.0
2001									11	2								4.8	1.3	2.3
2002									11	2								4.5	1.0	1.7
2003									11	2								4.3	0.7	1.3
2004									11	2								4.2	0.6	1.0
2005									7	2								4.1	0.4	0.8
2006									5	2								4.0	0.3	0.6
2007									2	1								3.3	0.2	0.4
2008																		1.6	0.1	0.2
2009																		0.3	-0-	-0-
Total	6	57.0		2	381.4	53	196.1		168		2	22.4	230	635	1	201.8	1,493.7	219.0	180.0	316.0
												Average Annual Production							8.2	14.4
												Peak Production (Mbbls/d and MMcf/d)							89.9	157.5

All costs are "as installed" in millions of 1979 dollars.
Source: USDI 1979a; Alaska OCS Office, 1979;

1/ Years of exploratory well successes.

2/ Cost of exploration and delineation wells are derived on a per unit basis from GS estimates of total exploratory and expendable well investment costs divided by number of wells:

Scenario	Cost-- Exploration	Cost-- Expenditure	Total	# Exploratory Drilling Wells	P/Unit Cost
Minimum	74	46	190	11	10.9
Mean	98	69	167	16	10.4
Max "R"	147	116	263	28	9.4
Alt IV	49	35	84	10	8.4
Alt V	24.5	23.1	47.6	5	9.5

3/ Platform costs (from Dames & Moore, "Technical Report Number 43, Lower Cook Inlet and Shelikof Strait Petroleum Development Scenarios," Appendix B.)

All costs quoted from Dames and Moore have been indexed from 1978 to 1979 at 12.1% using the index of Finished Goods from October 1978 to October 1979, from "Economy Week" (Citibank), November 5, 1979.

All gas is associated. Platforms are assumed to be Steel Jacket.

Fabrication Costs

Water Depth	
100 ft.	$ 39.2 million
300 ft.	$ 72.9 million
600 ft.	$201.8 million

Average Water Depth (Dames & Moore, p.2):

Lower Cook	200 ft.
Shelikof Strait	600 ft.

Assume half of platforms are in Cook/Shelikof, except Alternatives IV and V where all are in Cook.

Therefore, platform fabrication costs are:
½(39.2 + 72.9)/2 and ½(201.8)=$128.9 million
for minimum, mean, and maximum and
(39.2 + 72.9)/2 $56.1 million for Alternatives IV and V

Installation Costs = $67.3 million
Includes site preparation,tow out, setdown, pile driving, module lifting, facilities hookup, etc.

Platform Equipment and Facilities

Peak Capacity (Mbbls/d)	
25	53.8
25-50	67.3
50-100	106.5

4/ One service well per four production wells is assumed.

5/ Average vertical depth 10,000 ft. (GS)
Cost = $3.7 million/well (Dames & Moore)

6/ Well workovers are assumed to begin in the fifth year of each well's operation on average, and proceed on a four to five year cycle. One workover rig per platform is assumed.

7/ Existing or minimally modified supply/support facilities are assumed to be used at Nikiski (bulk cargo) and Kodiak or Cape Chiniak (air support) for exploration activity. Alternative potential marine supply/support facilities include Homer and possibly Seward. One or more of these sites or possibly a remote site within the Kodiak Island Borough is assumed to be expanded to accommodate development and production activities. On the mean and maximum scenarios, one or more of the Cook Inlet sites is assumed to be expanded to accommodate development and production activity in the northern portion of the sale area.

8/ The approximate assessed valuation of OCS related facilities currently in place at Yakutat, Cape Yakataga, and Seward was $5 million (see Eastern Gulf of Alaska, Sale 55 EIS, Footnote 3 to Tables A-1 through A-6). For this analysis the figure was doubled to accommodate production and indexed to 1979 for $11.2 million/facility.

9/ Pipeline lengths in miles (BLM/OCS):

	Oil		Gas	
Scenario	Onshore	Offshore	Onshore	Offshore
Minimum	0	80	70	80
Mean	10	160	70	160
Maximum	10	160	70	160
Mod 2	0	90	70	90
Mod 3	0	80	70	80

Pipeline Diameter (GS):

Oil--18"-26"	(For the purpose of investment calculation we will assume 22" for all cases)
Gas--10"-26"	(For the purpose of investment calculation we will assume 18" for all cases)

Pipeline Costs (Dames & Moore)

Marine (Includes Burial)

20"-29"	$4.5 million/mile
10"-19"	$3.0 million/mile
Under 10"	$1.5 million/mile

Onshore

20"-29"	$ .8 million/mile
10"-19"	$ .5 million/mile
Under 10"	$ .2 million/mile

10/ The oil terminal is assumed to be located in the Anchor Point area, though use of the existing Nikiski and Drift River facilities is possible depending upon the location of the producing fields. (On the mean and maximum scenarios, another oil terminal is assumed in the Marmot Bay area.) Natural gas in all cases is assumed to be pipelined to existing capacity in the Nikiski area (including Pacific Alaska's proposed LNG plant).

11/ Oil terminal costs (Dames & Moore):

Peak Throughput mmbbls/d	Cost
Under 10C	$201.8 million
100-200	$302.7 million
200-300	$470.8 million
300-500	$605.3 million

The following functions are performed: pipeline terminal (for offshore lines), crude stabilization, LPG recovery, tanker ballast treatment, crude storage (10 days production), and tanker loading for crude trans-shipment.

12/ Please note that the development and production scenario for alternative VI will be essentially that of the minimum case.

Summary of Activities Required to Develop the Estimated Resources Within the Proposed Action
Minimum Case
Table A-6

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1. Estimated acreage, construction activity and resources:
   - a. Sale Acreage Offering: 350182 hectares (864,646 acres)
   - b. Exploration and Delineation Wells: 11
   - c. Production Platforms: 2
   - d. Production and Service Wells: 96
   - e. Workover Wells: 308
   - f. Pipelines:

	Oil (18" diameter)	Gas (10" diameter)
Offshore length:	129 km (80 mi to Anchor Point)	129 km (80 mi to Anchor Poin
Onshore length:	0	113 km (70 mi to Nikiski)

   - g. Terminal(s):

     Oil: 1 (Anchor Point)
     Gas: Use existing terminal at Nikiski.

   - h. Recoverable Hydrocarbons:

	Oil	Gas
Total Production:	332.0 MMbbls	581.0 Bcf
Peak Production:	151.5 Mbbls/D	265.2 MMcf/D
Average Annual Production:	14.4 MMbbls	24.2 Bcf

2. Estimated peak annual transportation by tanker:
   Oil: 55.3 MMbbls
   LNG: 28 MMbbls

3. Estimated tonnage (2,000 lbs/ton) of commercial muds and volume of drill cuttings (assuming 11 exploration wells at 4864 m (16,000 ft) and 96 production wells at 3040 m (10,000 ft):

	Exploration/Production	
	Per Well	Total Field
Muds:	947/680 metric tons (1,044/750 tons)	10416/65280 metric tons (11,484/72,000 tons)
Cuttings:	539/206 m^3 (704/269 yd^3)	5929/19776 m^3 (7,744/25,824 yd^3)

4. Estimated volume of formation water produced:
A prediction cannot be made at this time due to incomplete knowledge of the subsea geology of the Shelikof Strait. However, based upon the behavior of the upper Cook Inlet field, we may hypothesize that at midlife the sale 60 field will be producing one barrel of formation water for every two barrels of oil.

5. Estimated land use requirements for onshore facilities:

Support/Supply:	Existing facilities in Kenai should suffice. However, a small 10 hector (25 acre) marine support facility could be constructed at Homer.	
	Oil	Gas
Terminal(s) and related facilities:	1 terminal (24 hectares/60 acres)	1 compressor station (16 hectares/40 acres)

6. Estimated burial disturbance of offshore pipeline (assuming 2377 m^3/km (5,000 yd^3/mi) for oil pipeline and 1902 m^3/km (4,000 yd^3/mi) for gas pipeline) will be:

Oil: 306633 m^3 (400,000 yd^3)

Gas: 245358 m^3 (320,000 yd^3)

Summary of Activities Required to Develop the Estimated Resources Within the Proposed Action
Maximum Case
Table A-7

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1. Estimated acreage, construction activity and resources:
   - a. Sale Acreage Offering: 350182 hectares (864,646 acres)
   - b. Exploration and Delineation Wells: 28
   - c. Production Platforms: 6
   - d. Production and Service Wells: 295
   - e. Workover Wells: 944
   - f. Pipelines:

	Oil (26" diameter)	Gas (26" diameter)
Offshore length:	129 km (80 mi to Anchor Point)	129 km (160 mi to Nikiski)
Onshore length:	129 km (80 mi to Chernof Point) 16 km (10 mi to Talnik Point)	113 km (70 mi to Nikiski)

   - g. Terminal(s):

     Oil: 2 (Anchor Point and Talnik Point)
     Gas: Use existing terminal at Nikiski.

   - h. Recoverable Hydrocarbons:

	Oil	Gas
Total Production:	1,015.0 MMbbls	1,776.0 Bcf
Peak Production:	342.2 Mbbls/D	598.9 MMcf/D
Average Annual Production:	37.6 MMbbls	63.4 Bcf

2. Estimated peak annual transportation by tanker:
   Oil: 124.9 MMbbls
   LNG: 65 MMbbls

3. Estimated tonnage (2,000 lbs/ton) of commercial muds and volume of drill cuttings (assuming 28 exploration wells at 4864 m (16,000 ft) and 295 production wells at 3040 m (10,000 ft):

	Exploration/Production	
	Per Well	Total Field
Muds:	947/680 metric tons (1,044/750 tons)	26516/200600 metric tons (29,232/221,250 tons)
Cuttings:	539/206 m^3 (704/269 yd^3)	15092/60770 m^3 (19,712/79,355 yd^3)

4. Estimated volume of formation water produced:
A prediction cannot be made at this time due to incomplete knowledge of the subsea geology of the Shelikof Strait. However, based upon the behavior of the upper Cook Inlet field we may hypothesize that at midlife the sale 60 field will be producing one barrel of formation water for every two barrels of oil.

5. Estimated land use requirements for onshore facilities:

Support/Supply: Existing facilities in Kenai would expand by an unknown amount of acreage. However, a small, 10-hector (25-acre) marine support facility could be constructed at Homer.

	Oil	Gas
Terminal(s) and related facilities:	2 terminals (69 hectares/170 acres each)	1 compressor station (16 hectares/40 acres)

6. Estimated burial disturbance of offshore pipeline (assuming 2853 m^3/km (6,000 yd^3/mi):

Oil: 368037 m^3 (480,000 yd^3) each to Anchor Point and Chernof Point

Gas: 736074 m^3 (960,000 yd^3) to Anchor Point

Summary of Impacts
for the Minimum and Maximum Cases

The environmental impacts from proposed lease sale 60 are based on the mean case, which represents a middle ground in the range of potentially recoverable oil and gas resources estimated for the proposed lease sale area. The minimum and maximum cases are the extremes of the resource estimate range. Potentially recoverable resources (total production of the field) are estimated to range from 332 to 1,015 million barrels of oil and from 581 to 1,776 billion cubic feet of gas. The following summarizes the possible environmental impacts for major scoping issues that could derive from the minimum and maximum cases, based on the developmental scenarios established for the respective quantities of potentially recoverable resources.

Minimum Case:

Impacts on Commercial and Sport Fish: The impacts on commercial and sport fish from the minimum case could possibly be less than the impacts from the proposed action as a result of reduced population pressure and a possible reduction in the potential risk from oilspill incidents due to one less platform in operation and five fewer wells drilled during exploration, two less platforms at work and about 100 fewer wells drilled for production, a reduction of 338 million barrels of oil and 592 billion cubic feet of gas in the estimated total production of the field, and a reduction in the peak annual volume of oil and LNG transported by tankers of 41.5 and 22.0 million barrels, respectively.

Impacts on Commercial Fishing: The impacts on commercial fishing from the minimum case could possibly be less than the impacts from the proposed action as a result of reduced population pressure, a reduced potential for employment competition with the fishing industry, due to reduced OCS employment demands (a reduction in the peak average monthly demand of 461 employees during the development phase), a reduction by 1608 hectares (4,022 acres) of fishing grounds that might be removed due to offshore platform construction and operation, and the possible reduction in the potential risk from oilspill incidents as cited under fish resources above.

Impacts on Social Factors: The impacts on social factors from the minimum case could possibly be less than the impacts from the proposed action as a result of reduced population pressure and a possible reduction in the potential risk from oilspill incidents due to the factors cited under fish resources above.

Impacts on State, Regional, and Local Economies: The impacts on State, regional, and local economies from the minimum case could possibly be less than the impacts from the proposed action as a result of reduced population, employment, and income effects and a possible reduction in the potential risk from oilspill incidents to the fisheries sector of the economy due to the factors cited under fish resources above.

Impacts on Land Status and Land Use: The impacts on land status and land use from the minimum case could possibly be less than the impacts from the proposed action as a result of reduced demand for urban land and facilities as a function of reduced population and employment demand, and a reduction in need for onshore oil and gas facilities by 72 hectares (180 acres) due to a reduction in potentially recoverable resources.

Impacts on Transportation Systems: The impacts on transportation systems from the minimum case could possibly be less than the impacts from the proposed action as a result of reduced drilling activity and less tanker traffic to transport the product to market as a function of reduced potentially recoverable resources, as indicated under fish resources and elsewhere above.

Impacts on Alaska Coastal Management Program: The impacts on the Alaska Coastal Management Program from the minimum case could possibly be less than the impacts from the proposed action as a result of a 1- to 2-year difference in the timing of development but, procedurally, the impacts would be substantially the same as for the proposal.

Impacts on Water Quality: The impacts on water quality from the minimum case could possibly be less than the impacts from the proposed action as a result of reduced drilling activity as indicated under fish resources above.

Impacts on Endangered Cetaceans: The impacts on endangered cetaceans from the minimum case may possibly be less than the impacts from the proposed action as analyzed in the worst case (sec. IV.E.1.), but insufficient information prevents such analysis.

Maximum Case:

Impacts on Commercial and Sport Fish: The impacts on commercial and sport fish from the maximum case could possibly be greater than the impacts from the proposed action as a result of increased population pressure and a possible increase in the potential risk from oilspill incidents due to one more platform at work and 12 more wells drilled during exploration, two more platforms in operation and about 100 more wells drilled for production, an increase of 345 million barrels of oil and 603 billion cubic feet of gas in the estimated total production of the field, and an increase in the peak annual volume of oil and LNG transported by tanker of 28.1 and 15.0 million barrels, respectively.

Impacts on Commercial Fishing: The impacts on commercial fishing from the maximum case could possibly be greater than the impacts from the proposed action as a result of increased population pressure, an increased potential for employment competition with the fishing industry due to increased OCS employment demands (an increase in the peak average monthly demand of 337 employees during the development phase), an increase by 1608 hectares (4,022 acres) of fishing grounds that might be removed due to offshore platform construction and operation, and the possible increase in the potential risk from oilspill incidents as cited under fish resources above.

Impacts on Social Factors: The impacts on social factors from the maximum case could possibly be greater than the impacts from the proposed action as a result of increased population pressure and a possible increase in the potential risk from oilspill incidents due to the factors cited under fish resources above.

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Impacts on State, Regional, and Local Economies: The impacts on State, regional, and local economies from the maximum case could possibly be greater than the impacts from the proposed action as a result of increased population, employment, and income effects and a possible increase in the potential risk from oilspill incidents to the fisheries sector of the economy due to the factors cited under fish resources.

Impacts on Land Status and Land Use: The impacts on land status and land use from the maximum case could possibly be greater than the impacts from the proposed action as a result of increased demand for urban land and facilities as a function of increased population and employment demand, and an increase in need for onshore oil and gas facilities by 40 hectares (100 acres) due to an increase in potentially recoverable resources.

Impacts on Transportation Systems: The impacts on transportation systems from the maximum case could possibly be greater than the impacts from the proposed action as a result of increased drilling activity and increased tanker traffic to transport the product to market as a function of increased potentially recoverable resources, as indicated under fish resources and elsewhere above.

Impacts on Alaska Coastal Management Program: The impacts on the Alaska Coastal Management Program from the maximum case could possibly be greater than the impacts from the proposed action as a result of a 1- to 2-year difference in the timing of development, but procedurally the impacts could be substantially the same as in the proposal.

Impacts on Water Quality: The impacts on water quality from the maximum case could possibly be greater than the impacts from the proposed action as a result of increased drilling activity, as indicated under fish resources above.

Impacts on Endangered Cetaceans: The impacts on endangered cetaceans from the maximum case may possibly be greater than the impacts from the proposed action, but insufficient information prevents such analysis. Refer to the worst case analysis (sec. IV.E.1.).

APPENDIX B

ESTIMATION OF DIRECT EMPLOYMENT AND DESCRIPTION OF BASIC ASSUMPTIONS UTILIZED

This section summarizes the estimated direct employment anticipated to result from the alternatives, including the proposal, as described in section I. The summary tables are included for reference purposes (tables B-1 through B-5). The development assumptions are summarized in section I, Alternatives Including Proposed Action; anticipated activities resulting from potential oil and gas development are described in section IV.A.1., Basic Assumptions Regarding Causes of Possible Impact Resulting from the Alternatives Including the Proposal; and are discussed further in this section in terms of activities which generate employment. The reader is referred to these pages and tables for a thorough understanding of the estimates, employment, and population effects.

Exploration Activity: After issuance of leases and required permits, exploratory drilling would be initiated. The exclusive use of semisubmersible drilling rigs is assumed; however, the use of other types of drilling units such as jack-ups may be possible. It is judged, however, that environmental conditions such as water depth (limiting the use of jack-ups) and the length and severity of storms (limiting the use of jack-ups and drillships) would restrict their widespread use. Indeed, the performance of the drillship Diamond M. Dragon, during the exploratory activities of sale CI, indicated that the inclement weather of lower Cook Inlet and Shelikof Strait would greatly hinder the activities of drillships.

In conducting an exploratory program, the operator typically performs supervisory and administrative functions, contracting with oil field service firms to perform the major drilling and logistic functions. These functions include drilling, mud engineering, well logging, completion services, diving, any predrilling biological or other surveys, and supply (vessels, aircraft, and shore based facilities). Operator personnel are typically composed of managers, operations superintendents, geologists, engineers, material expediters, and administrative support staff. These functions are detailed in the following paragraphs and are based upon previous drilling activity in the western Gulf of Alaska (OCS sale 39).

Based upon Gulf of Alaska experience, drilling contractor crews would likely work the same number of days on as off. ODECO used a 28-day rotation scedule with half the shipboard employees changing every 7 days. SEDCO used a 21-day rotation schedule. The rotation factor would be 2, thus total employment would be 68 per drilling platform.

Supply/support vessels used for exploratory activity would be similar to those used as a result of sale 39 and sale CI, i.e., supply vessels in the 200-foot class with 6,000-7,000 plus horsepower. Many would have anchor handling capability. (See Dames and Moore, 1979, pp. 11-13, for a detailed description of these supply vessels and cargo capabilities.) Each vessel is assumed to employ a crew of 13 on duty 24 hours per day, working 40 days on and 20 days off. Total employment per vessel would then be 20. Two supply vessels are assumed to serve each active rig; one of these vessels would always be in the vicinity of the rig in case emergency evacuation was required. Four would work the day shift, two the night shift, and one would accomplish miscellaneous tasks. Assuming employees worked 28 days on and 14 days off, total catering services employment would be 11 (Dames and Moore, 1979, pp. 36-37, from A.R.A. Services, Inc.).

Crew changes and light cargo transfer from ship-to-shore are assumed to be made via helicopter of a type similar in capability to the Sikorsky S-61's employed in previous Gulf of Alaska drilling. It is assumed one helicopter would be needed per rig, plus a common backup. For example, if only one platform were active, two helicopters would be required. Should more than one platform be employed, the total number of helicopters employed in the field would be N + 1. Where N equals the total number of platforms in the field and the + 1 is a backup helicopter.

Based on gulf experience, two pilots are required in flight and three mechanics are required per machine. Crews would work 14 days on and 14 days off, thus each active rig would employ a total of 10 (Dames and Moore, 1979, p. 38., from ERA Helicopters).

Shore bases serve as storage and transfer points for offshore operations. Heavy goods such as casing and drill pipe, water, fuel, muds and chemicals are stored and transferred to supply vessels for delivery offshore. Typical facilities include heliopads, runways, open and covered storage, mud, water and fuel storage, docks, and minor repair facilities.

The shore base complement at Yakutat employed some 90 personnel during previous exploratory activities in the eastern Gulf of Alaska. Of this number at least half were devoted to marine support activities. According to the tenets of the mean case scenario associated with the proposed action, Port Lions would have responsibility for air support activities only. As a result of this limited responsibility, the shore base complement at Port Lions would be reduced by at least half from that needed for Yakutat. In regard to the Nikiski support facility, it would need at least a full complement of 90 or more workers.

Mud engineering and mud logging may or may not be provided by the same firm. Mud engineering firms supply the drilling muds. Based upon previous gulf activity, 1 such engineering position is required during drilling; the position is filled by 1 engineer on call 24 hours per day, working 7 days on and 7 days off (Dames and Moore, August 1978, pp. 38-39, from Magcobar and Schlumberger). Extrapolating this experience to the future, 2 mud engineers would be required per rig, 1 on duty and 1 off duty.

Well logging services include mud logging and electric logging. Based upon Gulf of Alaska experience, mud logging typically requires 2 men on board the drilling rig, each working a 12-hour shift. Electric logging does not require a permanent crew aboard the vessel. Contracts with operators required 3 men assigned to each rig who would provide services as required. A typical trip to the rig for the 3 men would require about 5 days. Two or more trips might be made to the rig per month by the 3-man crew. Special problems could require more frequent service (Dames and Moore, August 1978, p. 39, from Schlumberger). Thus, employment per rig to perform the well logging function is 7.

Cementing is the primary completion service resulting in offshore employment. One engineer may be assigned to each rig. This engineer would be on call on a 24-hour basis, working 21 days on and 21 days off (Dames and Moore, 1979, p.40, from Halliburton). Cementing services would account for the employment of 2 engineers per active rig.

Diving services may involve up to 7 divers per rig; however, only 2 would live onboard to maintain and ready equipment between dives. Diving services would, thus account for a maximum of 7 employees per rig (Dames and Moore, 1979, p.40, from Oceaneering); 3 full time equivalents are assumed here.

As stated earlier, operators perform the supervisory and administrative functions governing an exploratory drilling program, overseeing drilling and logistics activities, evaluating drilling results and administrative support. The number of operator personnel varies by company, and presumably, by the specific drilling program itself. (Reference the Notices of Support Activity submitted by operators in compliance with sale 39, Stipulation No. 5.) Notices submitted as a result of sale 39 indicate a total operator complement of 10 per rig is representative, including onshore logistics personnel. Allowing 2 onshore logistics positions (already accounted for under the shore facility discussion), a total of 8 (additional) operator personnel per rig is assumed here.

Development Activities: The results of exploratory drilling would be evaluated and the decision made as to whether or not the next stage of operations would be undertaken. If the results of the exploratory activity do not reveal economically producible quantities of oil and/or gas, no further impacts would result from this proposed sale. However, for assessment purposes, exploratory drilling is assumed to yield commercial deposits of oil and natural gas.

The production of the estimated recoverable petroleum resources would require the construction and placement of production structures, and the drilling of development wells, along with the construction of support bases and facilities for gathering, storing, and transporting oil and gas from the acreage leased.

The precise type of production facilities, the number of development wells required, the location of any onshore facilities required, and the possible route of pipelines and other transportation facilities required to bring the produced oil and gas to shipping terminals would be dependent primarily on the information gained as a result of the exploratory drilling, modified by additional data obtained as a result of developmental drilling. Other factors influencing the type of facilities required (in addition to the number of fields and amount of resource discovered), are water depth, character of the sea floor, depth to the producing horizon, number of wells required for efficient recovery (i.e., the spacing of the wells), and the structural position of the producing wells.

Offshore Employment: Development activity is distinguished from exploration activity in terms of the level (and intensity) of activity and, to a lesser extent, functions performed. Drilling and well service personnel requirements are generally less. Assuming normal circumstances, measurements of well data are fewer, casing and drill string needs may be less and diving services generally are not needed. The reduced need for services decreases drilling related employment (on a per active rig basis) during the development phase.

Total onboard drilling crew requirements during the development phase are estimated at 27 (2 fewer than estimated for exploratory drilling); assuming a rotation factor of 2, total drilling crew employment would be 54 per active rig.

Total well service personnel requirements are estimated at 7. Functions included are mud engineering, cementing, special casing crews, and personnel which may be required in survey and fishing services. The estimate represents an average of well service personnel. Periodically, during the drilling of a well, special crews are needed to perform specialized functions, however, these tasks are of limited duration. Thus, an average of 7 is used to reflect these periodic services (Alaska OCS Office and personal communication with Mobil Oil, Anchorage, Alaska, February 1979).

Production platform operation personnel are estimated in table B-14. Production platforms placed in lower Cook Inlet would be similar to existing platforms in upper Cook Inlet, i.e., steel bottom-founded, with certain design accommodations, e.g., for greater water depth. Based upon upper Cook Inlet experience, onboard production employment is estimated at 23 per platform; a 1 week on, 1 week off work schedule is assumed. Hence, total employment per platform would be 46.

Catering services employment is assumed comparable to that estimated for exploration activity, i.e., a total of 11 would be employed in catering services.

Shore-based operating and supply/support personnel requirements are judged similar to exploration phase requirements. Each fully staffed shore base is assumed to require a total operating complement of 25, or half that amount when only 1 rig is active. Each active rig is assumed to require the services of 1 helicopter of the Sikorsky S-61 type, plus a common backup at all times. Each active (development) drilling rig is assumed to require the services of 2 supply vessels. Upon completion of development drilling, each platform is assumed to be serviced by a single supply vessel.

Table B-2 summarizes production, drilling, and supply/support related employment assumptions.

Technical and Management Operations Staff: The size of technical and management operations staffs (e.g., geologists, engineers, drilling foremen, and managers) would depend on the amount of development and production activity. Headquarters staff is assumed to number 30 individuals at the start of the production phase and decrease with the diminishing size of the field.

Construction Activity: Development and production activities must be preceded by the construction, installation, and assembly of permanent platforms, pipeline construction for transport of the produced oil and gas to production treatment facilities and terminals, and shore base construction.

Platform Installation: The installation of the platforms would involve the temporary employment of specific contractors for specific tasks such as platform construction, placement, pile driving, deck structure placement, and finishing. It is assumed all platforms would be constructed at facilities outside Alaska, towed to the field location, set in place, deck structures installed, and finished. Typically, tug crews, derrick barge personnel, welders, electricians, equipment installers, and others are employed for brief periods during placement and assembly of the platform.

The total number of personnel required to set and assemble multiple platforms per season would depend on many factors, such as the number of platforms to be set, environmental constraints (e.g., weather), the type and availability of equipment used, and the number of oil field operators involved. For assessment purposes, it is assumed a complete work crew consisting of the above mentioned skills approximates 100 workers. Because of the relatively short offshore construction season (approximately April to September), few economies of scale may be realized in platform installation. For example, the length of the construction season may not permit the use of a single derrick barge for deck structure placement on 2 platforms; 2 barges in simultaneous operation may be required. For purposes here, a complete complement of 6 crew and equipment to install each platform is assumed as required. Note, however, that individual crews would be on-site less than 6 months, and many would be housed offshore. It is assumed 14 months are required from installation to commissioning. Thus, in estimating average annual employment, 7 months of construction effort is allocated to the year a platform is shown as "installed," and 7 months of effort to the following year.

Pipeline Installation: Pipelines linking the platforms to terminals must be fabricated and installed using a pipe lay barge. On and offshore pipelines are assumed to be constructed. Offshore pipelines would be constructed by means of pipe lay barges working primarily during the summer season. It is anticipated that the major effort of onshore pipeline construction would also occur during the summer months. It is not expected that offshore pipeline construction would provide year-round employment, i.e., offshore pipeline construction would likely require approximately 6 months in any year.

It is anticipated that large pipe lay barges similar to those utilized in the North Sea would be used for offshore pipeline construction. These units are largely self-contained, including living quarters; thus, it is estimated that most of these personnel would be housed offshore.

Based upon experience in the North Sea, each lay barge of the type described can install approximately .5 mi of offshore pipeline per day, including an allowance for non-productive time due to weather conditions. It is estimated that three would be required for a period of 6 months, per construction season, in the installation of offshore pipelines. Workers are not normally rotated on and off the work location for off-duty periods, thus no rotation factor is assumed.

Estimated on and offshore pipeline construction employment for the development phase is shown in table B-12.

Onshore Facilities - Supply/Support Bases, Production Treatment and Crude Oil Terminal Facilities: The construction of onshore facilities would involve the employment of construction personnel on a variable basis depending upon the season and specific skill required at any given time. Existing facilities may be utilized (in the case of shore bases), as well as new facilities constructed near existing communities or in remote locations. At remote construction sites, personnel would probably be housed in camps and be similarly housed in camps near existing communities where the community infrastructure cannot accommodate the additional services required.

Production Treatment and Crude Oil Terminal Facilities: The size, nature, and capacity of production treatment facilities would depend upon many factors, including the volume of water produced. For example, greater quantities of water requiring treatment may be produced in the latter stages of a field's production life than in the initial years of production. Thus, as greater treatment is required, employment may increase. It is assumed here, however, that each production treatment facility would require a total of 85 employees throughout its life. It is also assumed that production treatment facilities are co-located with the oil terminal.

Based on upper Cook Inlet experience (Drift River), approximately 30 personnel would be required to operate each crude oil terminal, along with an administrative support staff of 5, for a total of 35. Each crude oil tanker terminal facility would employ a total of 120 workers, 85 in production treatment operations and 35 in storage and tanker terminal operations (Alaska OCS Office, from Kenai Pipeline Co., 1978).

Supply/Support Base Construction· Supply/support bases would be required to service offshore development and production activity. Potential sites include those where the necessary facilities would be expanded upon the existing infrastructure (e.g., enlargement of piers, site improvement, etc.), and those where supply/support facilities would be constructed "from the ground up" at remote sites. Because this possible mix of facilities use/construction is unknown, and because engineering requirements would vary from site-to-site, it is not possible to estimate construction employment with any accuracy. An allowance of 75 workers for a period of 1 year is therefore included in an attempt to reflect this activity (Alaska OCS Office, from Bomhoff Associates, 1978). These workers would consist of "offshore" crews (pile driving, tug and barge personnel employed in pier loading or dock construction), heavy equipment operators, carpenters, welders, electricians, etc.

Construction activity would likely continue through the life of production due to upgrading and expansion or addition of facilities. However, the level of activity may vary greatly from year-to-year and, excepting major projects, would be small compared to the initial years of the development phase.

Table B-1
Lower Cook Inlet/Shelikof Strait
95 Percent Scenario
Estimated Development Employment - Development Phase

Year	Development Drilling (Mining)1/2/		Supply Support Aircraft/Vessels (Transportation)	Shore Bases (Mining)	Headquarters (Mining)	Oil Terminal (Transportation)	Production Operations (Mining)	Total Man Months	Average Monthly Employment
	(Wells)								
1981									
1982									
1983									
1984									
1985									
1986	(16)	1736	1320	720	25	720		4521	377
1987	(24)	2471	1320	720	50	1440	1104	7105	592
1988	(28)	2839	1320	720	184	1440	1104	7607	634
1989	(28)	2839	1320	720	321	1440	1104	7744	645
1990			1320	720	364	1440	1104	4948	412
1991	(18)	1656	720	720	364	1440	1368	6268	522
1992	(18)	1656	720	720	364	1440	1368	6268	522
1993	(18)	1656	720	720	364	1440	1368	6268	522
1994	(18)	1656	720	720	364	1440	1368	6268	522
1995	(18)	1656	720	720	364	1440	1368	6268	522
1996	(18)	1656	720	720	364	1440	1368	6268	522
1997	(18)	1656	720	720	364	1440	1368	6268	522
1998	(18)	1656	720	720	364	1440	1368	6268	522
1999	(18)	1656	720	720	364	1440	1368	6268	522
2000	(18)	1656	720	720	364	1440	1368	6268	522
2001	(18)	1656	720	720	364	1440	1368	6268	522
2002	(18)	1656	720	720	364	1440	1368	6268	522
2003	(18)	1656	720	720	364	1440	1368	6268	522
2004	(18)	1656	720	720	364	1440	1368	6268	522
2005	(18)	1656	720	720	364	1440	1368	6268	522
2006	(15)	1380	720	720	364	1440	1368	5992	499
2007	(13)	1196	720	720	364	1440	1368	5808	484
2008	(10)	920	720	720	364	1440	1368	5532	461
2009			720	720	364	1440	1368	4612	384
2010			720	360	182	720	684	2666	222
2011									
2012									
2013									
2014									
2015									

1/ Assumes 1.333 months to drill one well.

2/ Workover wells start year 1991.
Assume wells need workover @ 5-year interval.

Table B-2
Lower Cook Inlet/Shelikof Strait
Mean Scenario
Estimated Development Employment - Development Phase

Year	(Wells)	Development Drilling 1/2/ (Mining)	Supply Support Aircraft/Vessels (Transportation)	Shore Bases (Mining)	Headquarters (Mining)	Oil Terminal (Transportation)	Production Operations (Mining)	Total Man Months	Average Monthly Employment
1981									
1982									
1983									
1984									
1985									
1986	(26)	2787	1920	720	25	1440		6892	574
1987	(42)	4391	2520	720	50	2880	2208	12769	1064
1988	(42)	4391	2520	720	185	2880	2208	12904	1075
1989	(42)	4391	2520	720	372	2880	2208	13091	1091
1990	(42)	4391	2520	720	552	2880	2208	13271	1106
1991	(36)	3311	1560	720	636	2880	2736	11843	987
1992	(35)	3219	1560	720	636	2880	2736	11751	979
1993	(35)	3219	1560	720	636	2880	2736	11751	979
1994	(35)	3219	1560	720	636	2880	2736	11751	979
1995	(35)	3219	1560	720	636	2880	2736	11751	979
1996	(35)	3219	1560	720	636	2880	2736	11751	979
1997	(35)	3219	1560	720	636	2880	2736	11751	979
1998	(35)	3219	1560	720	636	2880	2736	11751	979
1999	(35)	3219	1560	720	636	2880	2736	11751	979
2000	(35)	3219	1560	720	636	2880	2736	11751	979
2001	(35)	3219	1560	720	636	2880	2736	11751	979
2002	(35)	3219	1560	720	636	2880	2736	11751	979
2003	(35)	3219	1560	720	636	2880	2736	11751	979
2004	(35)	3219	1560	720	636	2880	2736	11751	979
2005	(35)	3219	1560	720	636	2880	2736	11751	979
2006	(30)	2759	1560	720	636	2880	2736	11291	941
2007	(25)	2299	1560	720	636	2880	2736	10831	903
2008	(20)	1840	1560	720	636	2880	2736	10372	864
2009	(12)	1104	1200	720	636	2880	2052	8592	716
2010	(12)	1104	720	360	636	2880	1368	7068	589
2011			480	360	636	2880	684	5040	420
2012			480	360	318	1440	684	3282	274
2013									
2014									
2015									

1/ Assumes 1.333 months to drill one well.

2/ Workover wells start year 1991.
Assume wells need workover @ 5-year interval.

Table B-3
Lower Cook Inlet/Shelikof Strait
5 Percent Scenario (Maximum Case)
Estimated Development Employment - Development Phase

Year	(Wells)	Development Drilling (Mining)1/2/	Supply Support Aircraft/Vessels (Transportation)	Shore Bases (Mining)	Headquarters (Mining)	Oil Terminal (Transportation)	Production Operations (Mining)	Total Man Months	Average Monthly Employment
1981									
1982									
1983									
1984									
1985									
1986	(32)	3339	1920	720	25	1440		7444	620
1987	(60)	6179	3120	720	50	2880	2760	15709	1309
1988	(60)	6311	3720	720	185	2880	3312	17128	1427
1989	(60)	6311	3720	720	375	2880	3312	17318	1443
1990	(53)	4875	3120	720	558	2880	4104	16257	1355
1991	(69)	6346	2160	720	692	2880	4104	16902	1409
1992	(67)	6162	2160	720	794	2880	4104	16820	1402
1993	(53)	4875	2160	720	821	2880	4104	15560	1297
1994	(53)	4875	2160	720	821	2880	4104	15560	1297
1995	(53)	4875	2160	720	821	2880	4104	15560	1297
1996	(53)	4875	2160	720	821	2880	4104	15560	1297
1997	(53)	4875	2160	720	821	2880	4104	15560	1297
1998	(53)	4875	2160	720	821	2880	4104	15560	1297
1999	(53)	4875	2160	720	821	2880	4104	15560	1297
2000	(53)	4875	2160	720	821	2880	4104	15560	1297
2001	(53)	4875	2160	720	821	2880	4104	15560	1297
2002	(53)	4875	2160	720	821	2880	4104	15560	1297
2003	(53)	4875	2160	720	821	2880	4104	15560	1297
2004	(53)	4875	2160	720	821	2880	4104	15560	1297
2005	(53)	4875	2160	720	821	2880	4104	15560	1297
2006	(45)	4139	2160	720	821	2880	4104	14824	1235
2007	(37)	3403	2160	720	821	2880	4104	14088	1174
2008	(30)	2759	2160	720	821	2880	4104	13444	1120
2009	(15)	1380	2160	720	821	2880	4104	12065	1005
2010	(10)	920	1440	720	821	2880	2736	9517	793
2011	(8)	736	1080	720	821	2880	2052	8289	691
2012	(4)	368	720	720	821	2880	1368	6877	573
2013			720	720	821	2880	684	5825	486
2014			720	360	410	1440	684	3614	301
2015									

1/ Assumes 1.333 months to drill one well.

2/ Workover wells start year 1991.
Assume wells need workover @ 5-year interval.

Table B-4
Lower Cook Inlet/Shelikof Strait
Alternative IV
Estimated Development Employment - Development Phase

Year	(Wells)	Development Drilling (Mining)1/2/	Supply Support Aircraft/Vessels (Transportation)	Shore Bases (Mining)	Headquarters (Mining)	Oil Terminal (Transportation)	Production Operations (Mining)	Total Man Months	Average Monthly Employment
1981									
1982									
1983									
1984									
1985									
1986	(18)	1920	1320	720	25	720		4705	392
1987	(28)	2839	1320	720	49	1440	1104	7472	623
1988	(28)	2839	1320	720	181	1440	1104	7604	634
1989	(2)	184	720	720	287	1440	1368	4719	393
1990			720	720	287	1440	1368	4535	378
1991	(15)	1380	720	720	287	1440	1368	5915	493
1992	(15)	1380	720	720	287	1440	1368	5915	493
1993	(15)	1380	720	720	287	1440	1368	5915	493
1994	(15)	1380	720	720	287	1440	1368	5915	493
1995	(15)	1380	720	720	287	1440	1368	5915	493
1996	(15)	1380	720	720	287	1440	1368	5915	493
1997	(15)	1380	720	720	287	1440	1368	5915	493
1998	(15)	1380	720	720	287	1440	1368	5915	493
1999	(15)	1380	720	720	287	1440	1368	5915	493
2000	(15)	1380	720	720	287	1440	1368	5915	493
2001	(15)	1380	720	720	287	1440	1368	5915	493
2002	(15)	1380	720	720	287	1440	1368	5915	493
2003	(15)	1380	720	720	287	1440	1368	5915	493
2004	(15)	1380	720	720	287	1440	1368	5915	493
2005	(12)	1104	720	720	287	1440	1368	5639	470
2006	(12)	1104	720	720	287	1440	1368	5639	470
2007	(8)	736	720	720	287	1440	1368	5271	439
2008	(2)	184	480	720	287	1440	1368	4479	373
2009			480	720	287	1440	1368	4295	358
2010			480	360	141	720	684	2385	199

1/ Assumes 1.333 months to drill one well.
2/ Workover wells start year 1991.
Assume wells need workover @ 5-year interval.

Table B-5
Lower Cook Inlet/Shelikof Strait
Alternative V
Estimated Development Employment - Development Phase

Year	(Wells)	Development Drilling (Mining)1/2/	Supply Support Aircraft/Vessels (Transportation)	Shore Bases (Mining)	Headquarters (Mining)	Oil Terminal (Transportation)	Production Operations (Mining)	Total Man Months	Average Monthly Employment
1981									
1982									
1983									
1984									
1985									
1986	(24)	2471	1320	720	25	720		5256	438
1987	(24)	2471	1320	720	50	1440	1104	7105	592
1988	(5)	460	720	720	159	1440	1368	4867	406
1989			720	720	216	1440	1368	4464	372
1990			720	720	216	1440	1368	4464	372
1991	(11)	1012	720	720	216	1440	1368	5476	456
1992	(11)	1012	720	720	216	1440	1368	5476	456
1993	(11)	1012	720	720	216	1440	1368	5476	456
1994	(11)	1012	720	720	216	1440	1368	5476	456
1995	(11)	1012	720	720	216	1440	1368	5476	456
1996	(11)	1012	720	720	216	1440	1368	5476	456
1997	(11)	1012	720	720	216	1440	1368	5476	456
1998	(11)	1012	720	720	216	1440	1368	5476	456
1999	(11)	1012	720	720	216	1440	1368	5476	456
2000	(11)	1012	720	720	216	1440	1368	5476	456
2001	(11)	1012	720	720	216	1440	1368	5476	456
2003	(11)	1012	720	720	216	1440	1368	5476	456
2004	(11)	1012	720	720	216	1440	1368	5476	456
2005	(7)	644	720	720	216	1440	1368	5108	426
2006	(5)	459	720	720	216	1440	1368	4923	410
2007	(2)	184	480	360	216	1440	1368	4048	337
2008			480	360	216	1440	1368	3864	322
2009			480	360	158	720	684	2402	200

1/ Assumes 1.333 months to drill one well.

2/ Workover wells start year 1991.
Assume wells need workover @ 5-year interval.

Table B-6
Lower Cook Inlet/Shelikof Strait
95 Percent Scenario (Minimum Case)
Estimated Employment - Exploratory Phase
(Equipment/Man-Months)

Years	Drilling Rigs (Mining) 1/		Supply Support Aircraft/Vessels (Transportation)		Shore Bases	Total Man Months	Average Monthly Employment
1981	Sale--September						
1982	(1)	455	(2/2)	270	360	1085	90
1983	(2)	1364	(3/4)	765	720	2849	237
1984	(2)	1818	(3/4)	990	720	3528	294
1985	(2)	909	(3/4)	495	720	2124	177
1986	(1)	455	(2/2)	270	360	1085	90

1/ Assume 4.5 months to drill one well.

Table B-7
Lower Cook Inlet/Shelikof Strait
Mean Scenario
Estimated Employment - Exploratory Phase
(Equipment/Man-Months)

Years	Drilling Rigs (Mining) 1/		Supply Support Aircraft/Vessels (Transportation)		Shore Bases	Total Man Months	Average Monthly Employment
1981	Sale--September						
1982	(2)	1364	(3/4)	765	720	2849	237
1983	(3)	1818	(4/6)	1080	720	3618	302
1984	(3)	1818	(4/6)	1080	720	3618	302
1985	(2)	1364	(3/4)	765	720	2849	237
1986	(1)	909	(2/2)	540	720	2169	181

1/ Assume 4.5 months to drill one well.

Table B-8
Lower Cook Inlet/Shelikof Strait
5 Percent Scenario (Maximum Case)
Estimated Employment - Exploratory Phase
(Equipment/Man-Months)

Years	Drilling Rigs (Mining) 1/		Supply Support Aircraft/Vessels (Transportation)		Shore Bases	Total Man Months	Average Monthly Employment
1981	Sale--September						
1982	(2)	1818	(3/4)	990	720	3528	294
1983	(3)	2727	(4/6)	1440	720	4887	407
1984	(5)	4091	(6/10)	2115	720	6926	577
1985	(3)	2727	(4/6)	1440	720	4887	407
1986	(2)	909	(3/4)	495	720	2124	177
1987	(1)	455	(2/2)	270	720	1445	120

1/ Assume 4.5 months to drill one well.

Table B-9
Lower Cook Inlet/Shelikof Strait
Alternative IV
Estimated Employment - Exploratory Phase
(Equipment/Man-Months)

Years	Drilling Rigs (Mining)1/		Supply Support Aircraft/Vessels (Transportation)		Shore Bases	Total Man Months	Average Monthly Employment
1981	Sale--September						
1982	(2)	909	(3/4)	495	360	1764	147
1983	(2)	1364	(3/4)	765	720	2849	237
1984	(2)	1364	(3/4)	765	720	2849	237
1985	(1)	909	(2/2)	540	720	2169	181

1/ Assume 4.5 months to drill one well.

Table B-10
Lower Cook Inlet/Shelikof Strait
Alternative V
Estimated Employment - Exploratory Phase
(Equipment/Man-Months)

Years	Drilling Rigs (Mining)1/		Supply Support Aircraft/Vessels (Transportation)		Shore Bases	Total Man Months	Average Monthly Employment
1981	Sale--September						
1982	(1)	455	(2/2)	270	360	1085	90
1983	(2)	909	(3/4)	495	720	2124	177
1984	(2)	909	(3/4)	495	720	2124	177
1985	(1)	455	(2/2)	270	360	1085	90

1/ Assume 4.5 months to drill one well.

Table B-11
Lower Cook Inlet/Shelikof Strait
95 Percent Scenario (Minimum Case)
Estimated Construction Employment - Development Phase

Year	Platform Installation	Shore Base 1/	Pipeline Construction 3/	Oil Terminal 2/	Total Man Months	Average Monthly Employment
1981						
1982		(2) 670			670	56
1983						
1984						
1985	(1) 1250		2130		3380	282
1986	(1) 1250		1201	(1) 2700	5151	429
1987			131	1350	1481	123

1/ Assume expansion of existing facilities - 67 people for five months for both shore bases (Dames and Moore).

2/ Assume 225 people for 18 months (Dames and Moore).

3/ Assume 2 miles per day for onshore pipeline construction on Kenai. It should be noted that this ratio is only an approximation. Too many factors, such as right-of-way location, type of terrain, time of year, diameter of pipe, construction specifications, and river crossings can influence this ratio.

Table B-12
Lower Cook Inlet/Shelikof Strait
Mean Case
Estimated Construction Employment - Development Phase

Year	Platform Installation	Shore Base 1/	Pipeline Construction 3/	Oil Terminal 2/	Total Man Months	Average Monthly Employment
1981						
1982		(2) 3155			3155	263
1983						
1984						
1985	(1) 1250		2130		3380	282
1986	(2) 2500		2327	(2) 5400	10227	852
1987	(1) 1250		197	2700	4738	395

1/ Assume expansion of facilities on Kenai - 67 people for 5 months and major construction at Cape Chiniak - 235 people for 12 months. (Source: Dames and Moore)

2/ Assume 225 people for 18 months (Dames and Moore).

3/ Assume 2 miles per day for onshore pipeline construction on Kenai and 1 mile per day for construction on Kodiak. It should be noted that this ratio is only an approximation. Too many factors, such as right-of-way location, type of terrain, time of year, diameter of pipe, construction specifications, and river crossings can influence this ratio.

Table B-15
Lower Cook Inlet/Shelikof Strait
Alternative V
Estimated Construction Employment - Development Phase

Year	Platform Installation	Shore Base[1]	Pipeline Construction[3]	Oil Terminal[2]	Total Man Months	Average Monthly Employment
1981						
1982		(2) 670			670	56
1983						
1984						
1985	(1) 1250		2130		3380	282
1986	(1) 1250		569	(1) 2700	4159	377
1987			131	1350	1481	123

1/ Assume expansion of existing facilities (67 people for five months) for both shore bases (Dames and Moore).

2/ Assume 225 people for 18 months (Dames and Moore).

3/ Assume 2 miles per day for onshore pipeline construction on Kenai. It should be noted that this ratio is only an approximation. Too many factors, such as right-of-way location, type of terrain, time of year, diameter of pipe, construction specifications, and river crossings can influence this ratio.

Table B-13
Lower Cook Inlet/Shelikof Strait
5 Percent Scenario (Maximum Case)
Estimated Construction Employment - Development Phase

Year	Platform Installation		Shore Base 1/		Pipeline Construction 3/	Oil Terminal 2/		Total Man Months	Average Monthly Employment
1981									
1982			(2)	3155				3155	263
1983									
1984									
1985	(3)	3750			2130			5880	490
1986	(2)	2500			2568	(2)	5400	10468	872
1987	(1)	1250			219		2700	4169	347

1/ Assume expansion of facilities on Kenai (64 people for 5 months) and major construction at Cape Chiniak (235 people for 12 months). (Source: Dames and Moore)

2/ Assume 225 people for 18 months (Dames and Moore).

3/ Assume 2 miles per day for onshore pipeline construction on Kenai and 1 mile per day for construction on Kodiak. It should be noted that this ratio is only an approximation. Too many factors, such as right-of-way location, type of terrain, time of year, diameter of pipe, construction specifications, and river crossings can influence this ratio.

Table B-14
Lower Cook Inlet/Shelikof Strait
Alternative IV
Estimated Construction Employment - Development Phase

Year	Platform Installation		Shore Base 1/		Pipeline Construction 3/	Oil Terminal2/		Total Man Months	Average Monthly Employment
1981									
1982			(2)	670				670	56
1983									
1984									
1985	(1)	1250			2130			3380	282
1986	(1)	1250			601	(1)	2700	4551	379
1987					131		1350	1481	123

1/ Assume expansion of existing facilities - 67 people for five months for both shore bases (Dames and Moore).

2/ Assume 225 people for 18 months (Dames and Moore).

3/ Assume 2 miles per day for onshore pipeline construction on Kenai. It should be noted that this ratio is only an approximation. Too many factors, such as right-of-way location, type of terrain, time of year, diameter of pipe, construction specifications, and river crossings can influence this ratio.

Table B-16
Lower Cook Inlet/Shelikof Strait
95 Percent Scenario (Minimum Case)
Summary of Direct Employment

Year	Mining	Construction	Transportation	Total	Average Monthly Employment
1981	Sale--September				
1982	815	670	270	1755	146
1983	2084		765	2849	237
1984	2538		990	3528	294
1985	1629	3380	495	5504	459
1986	3296	5151	2310	10757	896
1987	4345	1481	2760	8586	716
1988	4847		2760	7607	634
1989	4984		2760	7744	645
1990	2188		2760	4948	412
1991	4108		2160	6268	522
1992	4108		2160	6268	522
1993	4108		2160	6268	522
1994	4108		2160	6268	522
1995	4108		2160	6268	522
1996	4108		2160	6268	522
1997	4108		2160	6268	522
1998	4108		2160	6268	522
1999	4108		2160	6268	522
2000	4108		2160	6268	522
2001	4108		2160	6268	522
2002	4108		2160	6268	522
2003	4108		2160	6268	522
2004	4108		2160	6268	522
2005	4108		2160	6268	522
2006	3832		2160	5992	499
2007	3648		2160	5808	484
2008	3372		2160	5532	461
2009	2452		2160	4612	384
2010	1226		1440	2666	222

Table B-17
Lower Cook Inlet/Shelikof Strait
Mean Scenario
Summary of Direct Employment

Year	Mining	Construction	Transportation	Total	Average Monthly Employment
1981	Sale--September				
1982	2084	3155	765	6004	500
1983	2538		1080	3618	302
1984	2538		1080	3618	302
1985	2084	3380	765	6229	519
1986	5161	10227	3900	19288	1607
1987	7369	4738	5400	17507	1459
1988	7504		5400	12904	1075
1989	7691		5400	13091	1091
1990	7871		5400	13271	1106
1991	7403		4440	11843	987
1992	7311		4440	11751	979
1993	7311		4440	11751	979
1994	7311		4440	11751	979
1995	7311		4440	11751	979
1996	7311		4440	11751	979
1997	7311		4440	11751	979
1998	7311		4440	11751	979
1999	7311		4440	11751	979
2000	7311		4440	11751	979
2001	7311		4440	11751	979
2002	7311		4440	11751	979
2003	7311		4440	11751	979
2004	7311		4440	11751	979
2005	7311		4440	11751	979
2006	6851		4440	11291	941
2007	6391		4440	10831	903
2008	5932		4440	10372	864
2009	4512		4080	8592	716
2010	3468		3600	7068	589
2011	1680		3360	5040	420
2012	1362		1920	3282	274

Table B-18
Lower Cook Inlet/Shelikof Strait
5 Percent Scenario (Maximum Case)
Summary of Direct Employment

Year	Mining	Construction	Transportation	Total	Average Monthly Employment
1981	Sale--September				
1982	2538	3155	990	6683	557
1983	3447		1440	4887	407
1984	4811		2115	6926	577
1985	3447	5880	1440	10767	897
1986	5713	10468	3855	20036	1670
1987	10884	4169	6270	21323	1777
1988	10528		6600	17128	1427
1989	10718		6600	17318	1443
1990	10257		6000	16257	1355
1991	11862		5040	16902	1409
1992	11780		5040	16820	1402
1993	10520		5040	15560	1297
1994	10520		5040	15560	1297
1995	10520		5040	15560	1297
1996	10520		5040	15560	1297
1997	10520		5040	15560	1297
1998	10520		5040	15560	1297
1999	10520		5040	15560	1297
2000	10520		5040	15560	1297
2001	10520		5040	15560	1297
2002	10520		5040	15560	1297
2003	10520		5040	15560	1297
2004	10520		5040	15560	1297
2005	10520		5040	15560	1297
2006	9784		5040	14824	1235
2007	9048		5040	14088	1174
2008	8404		5040	13444	1120
2009	7025		5040	12065	1005
2010	4477		5040	9517	793
2011	4329		3960	8289	691
2012	3277		3600	6877	573
2013	2225		3600	5825	485
2014	1454		2160	3614	301

Table B-19
Lower Cook Inlet/Shelikof Strait
Alternative IV
Summary of Direct Employment

Year	Mining	Construction	Transportation	Total	Average Monthly Employment
1981	Sale--September				
1982	1269	670	495	2434	203
1983	2084		765	2849	237
1984	2084		765	2849	237
1985	1629	3380	540	5549	462
1986	2665	4551	2040	9256	771
1987	4712	1481	2760	7472	623
1988	4844		2760	7604	634
1989	2559		2160	4719	393
1990	2375		2160	4535	378
1991	3755		2160	5915	493
1992	3755		2160	5915	493
1993	3755		2160	5915	493
1994	3755		2160	5915	493
1995	3755		2160	5915	493
1996	3755		2160	5915	493
1998	3755		2160	5915	493
2000	3755		2160	5915	493
2001	3755		2160	5915	493
2002	3755		2160	5915	493
2003	3755		2160	5915	493
2004	3755		2160	5915	493
2005	3479		2160	5639	470
2006	3479		2160	5639	470
2007	3111		2160	5271	439
2008	2559		1920	4479	373
2009	2375		1920	4295	358
2010	1185		1200	2385	199

Table B-20
Lower Cook Inlet/Shelikof Strait
Alternative V
Summary of Direct Employment

Year	Mining	Construction	Transportation	Total	Average Monthly Employment
1981	Sale--September				
1982	815	670	270	1755	146
1983	1629		495	2124	177
1984	1629		495	2124	177
1985	815	3380	270	4465	372
1986	3216	4519	2040	9775	815
1987	4345	1481	2760	8586	716
1988	2707		2160	4867	406
1989	2304		2160	4464	372
1990	2304		2160	4464	372
1991	2304		2160	4464	372
1992	2304		2160	4464	372
1993	2304		2160	4464	372
1994	2304		2160	4464	372
1995	2304		2160	4464	372
1996	2304		2160	4464	372
1998	2304		2160	4464	372
2000	2304		2160	4464	372
2001	2304		2160	4464	372
2002	2304		2160	4464	372
2003	2304		2160	4464	372
2004	3316		2160	5476	456
2005	2948		2160	5108	426
2006	2763		2160	4923	410
2007	2128		1920	4048	337
2008	1944		1920	3864	322
2009	1202		1200	2402	200

APPENDIX C

USGS ANALYSIS OF GULF OF ALASKA OCS OPERATING ORDERS

OCS ORDERS

OCS Orders are formally numbered directives issued to implement the provisions of Title 30 of the Code of Federal Regulations governing Oil and Gas Operations on the Outer Continental Shelf.

OCS Orders Nos. 1, 2, 3, 4, 5, 7, and 12, for the Gulf of Alaska were initially published in the Federal Register on January 3, 1975, with an invitation for the submission of comments and recommendations. The issuance of Outer Continental Shelf (OCS) Orders for the Gulf of Alaska was formally published by Federal Register Notice of March 9, 1976.

The Gulf of Alaska Orders were revised on May 18, 1979, after comments and recommendations were solicited by Federal Register Notice, June 29, 1977, (Vol. 42, No. 125) and August 25, 1977, (Vol. 42, No. 165).

Present OCS Orders 1, 2, 3, 4, 5, 6, 7, 8, and 12, were made effective by Federal Register Notice (Vol. 44, No. 247) Friday, December 21, 1979. The effective date of the present Orders was January 1, 1980.

Present Gulf of Alaska Orders cover the Gulf of Alaska, Cook Inlet, Kodiak, and the Southern Aleutian Shelf sale areas.

The following is an analysis of the present orders:

Gulf of Alaska OCS Order No. 1

This order requires all platforms, drilling rigs, drilling ships, and wells to have signs of standard specifications for identification of the operator, the specific lease block of operation, and well number.

This Order also requires that all subsea objects, resulting from lease operations which could present a hazard to other users of the OCS, must be identified by navigational markings as directed by the U.S. Coast Guard District Commander. Under this provision, the potential of accidents associated with subsea production systems, "stubs", fishing gear, and ship anchors, is substantially reduced as is the possibility of an oil spill from such an accident.

This Order also requires, whenever practicable, owner's identification, as approved or prescribed by the Director, to be placed upon all materials, cable, equipment, tools, containers, and other objects which could be freed and lost overboard from rigs, platforms, or supply vessels, and are of sufficient size, or are of such a nature, that they could be expected to interfere with commercial fishing gear if dropped overboard.

The Order mitigates impacts caused by offshore drilling and completion operations, fishing anchoring, shipping, and navigation activities.

Gulf of Alaska OCS Order No. 2

Proposed Order No. 2 concerns procedures for the drilling of wells. It requires the operators to file, under an approved exploration or a Development and Production Plan, a drilling application which includes information on the drilling platform or vessel, well casing, mud control, safety training of the operator's personnel, and a list describing critical drilling operations which may be performed. The Order then describes certain procedures, or equipment, to be used in each phase of the drilling operation.

Due to the technical complexity of the Order, not all details are included in describing its mitigatory impact. This proposed Order requires that drilling platforms and vessels to be capable of withstanding the oceanographic and meteorological conditions of the area; applications must include all pertinent data on the fitness of the platform or vessel, and each such drilling structure must be inspected by the U. S. Geological Survey (USGS) for compliance with the OCS Orders. During the period of operations, operators must collect and report oceanograhic, meteorological, and performance data. These requirements should mitigate concerns about the impact of weather, waves, sediment scour, and currents on offshore drilling units.

Order No. 2 requires operators to conduct shallow geological hazard surveys of the well site or lease block, prior to the commencement of drilling operations. The purpose of each survey is to locate shallow gas deposits, near-surface faults, obstructions, unstable bottom areas, or other conditions which are hazardous to drilling operations.

All wells must be cased and cemented to support unconsolidated sediments and to prevent communication of fluids between the formations, or pressure changes in the well. If there are indications of improper cementing, the operator shall re-cement and run logs to insure proper sealing of the well, or take other actions as approved by the Supervisor. The casing design and setting depths are to be based on all engineering and geologic factors, including the presence or absence of hydrocarbons, potential geologic hazards, and water depths. Additional casing strings may be required if abnormal geopressures are encountered. A pressure test is required of all casing strings, except the drive or structural casing, to determine the presence of leaks or inadequate cementing. The use of casing decribed in this Order should eliminate potential impacts of freshwater zone contamination, lost production, or the possibility of accidents caused by inadequate well control.

Operators are required to obtain directional surveys on all wells. These surveys, which are filed with the Supervisor, indicate whether the well is drilled in accordance with the planned bore hole migration. These surveys also provide the information required for the "target" of a relief well in the event of a blowout.

Blowout preventers and related pressure control equipment must be installed, used, and tested in a manner necessary to insure positive well control. A specific number of these preventers must be used in every well, and they must be equipped with dual control systems. The blowout preventers and related control equipment shall be adequately protected to ensure reliable operation under existing weather conditions. Special requirements are included for floating drilling operations which necessitate the placement of the blowout preventer stack on the sea floor. These devices provide protection against oil spills resulting from a loss of well control.

There are specific requirements for the use and testing of drilling muds. Drilling muds have a number of critical functions, one of the most important being the control of sub-surface pressures and the prevention of gaseous and liquid influxes into the wellbore. Drilling mud programs must be approved prior to the commencement of drilling. The operator must, at all times, maintain sufficient and readily accessible quantities of mud to insure well control. Drilling operations shall be suspended in the absence of minimum quantities of mud material specified, or as modified in the approved plan.

Representatives of the operator must provide on-site supervision of drilling operations around the clock. A member of the drilling crew, or the Tool Pusher, must maintain surveillance of the rig floor continuously from the time drilling operations commence until the well is secured with blowout preventors, bridge plugs, storm packer, or cement plugs. Lessee and drilling contractor personnel shall be trained and qualified in present-day methods of well control, and records of the training are to be kept at the well site. Specific well control training requirements are outlined in Geological Survey OCS Standard No. T1 (GSS-OCS-T1). The training requirements are intended to minimize the potential for well blowouts caused by human error. Formal training is supplemented with weekly blowout-prevention exercises for all rig personnel. Drills are frequently witnessed by USGS representatives and must always be recorded in the Driller's log.

Procedures to be followed when drilling operations may penetrate reservoirs known or expected to contain hydrogen sulfide (H_2S), or in areas where the presence of H_2S is unknown, are included in U.S. Geological Survey OCS Standard No. 1 (GSS-OCS-1), "Safety Requirements for Drilling Operations in a Hydrogen Sulfide Environment." This set of standard operating procedures will assure proper equipment testing, and crew training, should highly toxic H_2S be encountered. Hazards of H_2S are substantially reduced by the institution of these procedures.

Since some operations performed in drilling are considered more critical than others with respect to well control, and for the prevention of fire, explosions, oil spills, and other discharges and emmissions, each lessee must file a Critical Operations and Curtailment Plan for the Supervisor's approval.

This Order includes a requirement for listing and describing of critical operations that are likely to be conducted on the lease. Before exceeding the operational limits of an approved plan, the operator must notify the Supervisor and curtail operations. This allows the USGS to provide either specific approval in advance of the conduct of the critical operation, or to dispatch personnel to the lease site for observation of the operation. This part of OCS Order No. 2 provides additional regulatory review of drilling operations which may be hazardous to the drilling platform, vessel, crew, and the environment.

Order No. 2 also requires that when sufficient geological and engineering information is obtianed as a result of drilling operations, the lessee may make an application, or the Supervisor may require an application, for the establishment of field drilling rules. After field drilling rules have been established by the Supervisor, development wells shall be drilled in accordance with these rules, and the requirements of this Order, which are not affected by such rules.

In accordance with Section 21 of the OCS Lands Act Amendment of 1978, this Order requires the use of the Best Available and Safest Technologies (BAST). (This is discussed in the analysis of Order 5.)

Gulf of Alaska OCS Order No. 3

This Order relates to the plugging and abandonment of wells. For permanent abandonment of wells, cement plugs must be placed so as to extend above the top, and below the bottom, of freshwater and oil or gas zones to prevent those fluids from escaping into other strata. Portions of a well in which abnormal pressures are encountered are also required to be isolated with cement plugs. Plugs are required at the bottom of the deepest casing where an uncased hole exits below. Plugs or cement retainers are required to be placed above and below any perforated interval of the well hole used for production of oil and gas. If casing is cut and recovered, the casing stub shall be plugged.

Any annular space communicating with any open hole and extending to the ocean floor shall be plugged with cement. A surface plug at least 45 meters (148 feet) in length, with the top of the plug 45 meters (148 feet) or less below the ocean floor, shall be placed in the smallest string of casing which extends to the ocean floor.

The setting and location of the first plug below the surface casing shall be verified by either placing a minimum pipe weight on top of the plug or by pressure testing it with a designated minimum pump pressure. The space between the plugs must be filled with drilling mud of sufficient density to exceed the greatest formation pressure encountered in drilling the interval.

The casing and piling on the sea floor must be removed to a depth below the ocean floor as approved by the Supervisor. For temporary abandonments, all plugs and mud, discussed above, must be placed in the well with the exception of the surface plug. (The temporary abandoned well would have to be marked in accordance with Order No. 1.)

This Order should eliminate concern about contamination of freshwater zones or the possibility of oil and gas leaks from abandoned wells. The requirements that the sea floor above each final abandonment must be cleared, and that the removal depth of casing and piling must be examined on a case-by-case basis, will provide protection to navigation and fishery interest. The chance that obstructions might become exposed due to changes in bottom conditions is reduced as well.

Gulf of Alaska OCS Order No. 4

Order No. 4 provides for the extension of a lease beyond its primary term for as long as oil or gas may be produced in paying quantities and the lessee has met the requirements for diligent development. If these circumstances should occur, a lease can be extended beyond its initial term pursuant to the authority prescribed in 30 CFR 250.10 and 250.11, and in accordance with 30 CFR 250.12.

In addition to a production test for oil, one of similar duration is required for gas. All pertinent engineering, geologic, and economic data are required to support a claim that a well is capable of being produced in commercial quantities. Each test must be witnessed by the USGS although, with prior approval, an operator affidavit and third-party test results may be acceptable. When the District Supervisor determines that open hole evaluation data, such as wireline formation tests, drill stem tests, core data, and logs, have been demonstrated as reliable in a geologic area, such data may be considered as acceptable evidence that a well is capable of producing in paying quantities. The primary purpose of this Order is to provide for determinations of well productivity which may permit extensions of lease terms. Such extensions are frequently necessary to insure the orderly development of OCS oil and gas resources.

Gulf of Alska OCS Order No. 5

This Order sets forth requirements for the installation, design, testing, operation, and removal of subsurface safety devices. Due to the technical complexity of the Order, not all details are included in describing its mitigatory impact. In accordance with Section 21 of the OCSLAA of 1978, this Order requires the use of BAST. The lessee is encouraged to continue the development of safety-system technology. As research and product improvement results in increased effectiveness of existing safety equipment or the development of new equipment systems, such equipment may be used, and if such technologies provide a significant cost effective incremental benefit to safety, health, or the environment, shall be required to be used if determined to be BAST. Conformance to the standards, codes, and practices referenced in this Order, will be considered to be the application of BAST. Specific equipment, and procedures or systems not covered by standards, codes, or practices, will be analyzed to determine if the failure of such would have a significant effect on safety, health, or the environment. If such are identified, and until specific performance standards are developed or endorsed by the USGS, the lessee shall submit such information necessary to indicate the use of BAST, the alternatives considered to the specific equipment or procedures, and the rationale why one alternative technology was considered in place of another. This analysis shall include a discussion of the cost involved in the use of such technology and the incremental benefits gained.

This Order requires that Safety and Pollution-Prevention Equipment (SPPE) shall conform to the following quality assurance standards or subsequent revisions which the Chief, Conservation Division, USGS, has approved for use.

a. American National Standards Institute/American Society of Mechanical Engineers Standard "Quality Assurance and Certification of Safety and Pollution Preventional Equipment Used in Offshore Oil and Gas Operations", ANSI/ASME SPPE-1-1977, December 1977, (formerly ANSI/ASME-OCS-1-1977).

b. American National Standards Institute/American Society of Mechanical Engineers Standard "Accreditation of Testing Laboratories for Safety and Pollution Prevention Equipment Used in Offshore Oil and Gas Operations", ANSI/ASME-SPPE-2-1977, December 1977, (formerly ANSI/ASME-OCS-2-1977).

This Order requires that all well tubing installations, open to hydrocarbon-bearing zones, shall be equipped with a subsurface-safety device such as a Surface-Controlled Subsurface-Safety Valve (SCSSV), a Subsurface-Controlled Subsurface-Safety Valve (SSCSV), and injection valve, a tubing plug, or a tubular/annular subsurface-safety device unless, after application and justification, the well is determined to be incapable of flowing.

The lessee shall furnish evidence that the surface-controlled subsurface-safety devices and related equipment are capable of normal operation under subfreezing conditions. The surface controls may be located at a remote location.

These surface and subsurface safety valves, shall conform to "American Petroleum Institute (API) Specification for Subsurface-Safety Valves", API Spec 14A, Fourth Edition, November 1979, or subsequent revisions which the Chief, Conservation Division, has approved for use at the time of installation.

Testing or checking of these devices must be done at specified intervals. If a device does not operate correctly, it must be promptly removed and a properly operating device must be put in place and tested. Additionally, all tubing installations open to hydrocarbon-bearing zones and capable of flowing in which the subsurface-safety device has been removed, in accordance with the provisions of this Order, shall be identified by a sign on the wellhead stating that the subsurface-safety device has been removed. A subsurface-safety device shall be available for each well on the platform. In the event of an emergency, such as an impending storm, this device shall be properly installed as soon as possible with due consideration being given to personnel safety.

The subsurface-safety valves prescribed in this Order serve as a mechanism for automatically shutting in a well below the ocean floor in the event of an accident, or natural event, which destroys, or threatens to destroy, surface well control equipment. The reliability of such devices is maximized through regular testing. As a result of these requirements, the probability of a producible well blowout is minimized.

Proposed Order No. 5 also sets forth requirements for the design, installation, operation, and testing of safety systems for platform production facilities. All new platforms resulting from this sale will have to be in conformance with API RP 14C, "Analysis, Design, Installation, and Testing of Basic Surface Safety Systems on Offshore Production Platforms."

Prior to the installation of platform equipment, the lessees must submit, for the District Supervisor's approval, schematic diagrams with equipment, pipeing, firefighting, electrical-system, gas-detection, and safety-shutdown specifications. A Safety Analysis Function Evaluation Chart must also be submitted. This chart relates all sensing devices, shutdown devices, and emergency-support systems to their functions. The chart provides a means of verifying the design logic of the basic safety system.

This Order requires additional safety and pollution control requirements which midify or are in addition to those contained in API RP 14C for operation of pressure vessels, flowlines, pressure senors, emergency shutdown systems, engine exhaust systems, glycol dehydration units, gas compressors, fire fighting systems, fire and gas detection systems, electrical equipment and erosion detection and measurement equipment.

Whenever operators plan to conduct activities simultaneously with production operations, which could increase the possibility of occurrence of an undesirable event, a "General Plan for Conducting Simultaneous Operations" in a producing field must be filed for the Supervisor's approval. Activities requiring the plan include drilling, workover, wireline, pumpdown, and major construction operations. The intent of this requirement is to permit USGS review of the conduct, control, and coordinations of the proposed operations. This review will determine whether the operations can be conducted simultaneously without significantly increasing the risk of accidents or spills.

Prior to welding or burning operations, lessees must submit a plan describing personnel requirements and designating safe weldig areas. Procedures for establishing safe welding areas, and for conducting operations outside such areas, are specified in this Order. The requirements reduce the potential for explosions, injuries, and pollution discharges.

This Order also requires the lessees to maintain records, for a minimum period of five years, for each surface-safety device installed. These records shall be available for review by any authorized representative of the USGS. The records shall show the present status and history of each device, including dates and details of installation, inspection, testing, repairing, adjustments, and re-installation.

As per USGS's Failure and Inventory Reporting System (FIRS), which applies to offshore structures, including satellites and jackets, which produce or process hydrocarbons and includes the attendant portions of hydrocarbon pipelines, when physically located on the structure. When the devices specified are used as a part of the production safety and pollution prevention system, this Order requires the lessee to:

a. Submit an initial inventory of the safety and pollution prevention devices with periodic updates.

b. Report all device failures which occur.

To mitigate the potential for accidents resulting from human error, all personnel engaged in installing, inspecting, testing, and maintaining safety devices must meet specific training requirements. This Order also sets forth requirements for employee orientation and motivation programs concerned with safety and pollution prevention in offshore oil and gas operations.

Gulf of Alaska OCS Order No. 7

Order No. 7 relates to the prevention of pollution to the marine environment and provides rules for the disposal of waste materials generated as a result of offshore operations in a manner which will not "adversely affect the public health, life, property, aquatic life, wildlife, recreation, navigation, commercial fishing, or other uses of the ocean."

The operators must submit a list of drilling mud constituents, additives, and concentrations expected to be used; this provides a means to evaluate or alter the use and/or disposal of specific components which might be harmful to the environment. The disposal of drilling mud and drill cuttings, sand, and other well solids including those containing oil, is subject to the Environmental Protection Agency's permitting procedures, pursuant to the Federal Water Pollution Control Act, as amended. Approval of the method of drilling mud disposal into the ocean shall be obtained from the District Supervisor; each request will be decided on a case-by-case basis.

This Order requires that curbs, gutters, drip pans, and drains shall be installed in all deck areas in a manner necessary to collect all contaminants and to be piped to a properly designed, operated, and maintained sump system which will automatically maintain the oil at a level sufficient to prevent discharge of oil into OCS waters. Also, no solid waste materials or debris can be disposed of in the marine environment. Compliance with these requirements virtually eliminates the potential for adverse impacts on the biological communities, water quality, commercial fisheries, and offshore recreation, and also mitigates impacts along the coastline which would be caused by the washing of oil, fuel, chemical residues, or toxic substances to shore.

The disposal of equipment into the sea is prohibited, except under emergency conditions. The location and description of any equipment so discharged must be reported to the Supervisor. This requirement is intended to mitigate the potential for interference with commercial fishing operations.

All personnel must be thoroughly instructed in the prevention of pollution from offshore operations. Rigorous inspection schedules are required for all facilities. Pollution reports are required for all oil spills, and procedures are set forth for the notification of proper authorities. Pollution-control equipment must be maintained, or available, to each lessee. The equipment must include booms, skimmers, cleanup materials, and chemical agents. The equipment must be maintained and inspected monthly. (Chemical agents or additives for treatment of oil spills requires the consent of the Supervisor in accordance with Annex X, National Oil and Hazardous Substance Pollution Contingency Plan, and in accordance with the Memorandum of Understanding (MOU) between the Department of Transportation (U.S. Coast Guard) and the Department of Interior (U.S. Geological Survey), dated August 16, 1971).

This Order also sets forth requirements for pollution inspection of manned and unattended facilities on a daily basis or at intervals prescribed by the Supervisor, Also, it sets forth requirements for pollution reports.

Operators must submit an Oil Spill Contingency Plan for approval by the Supervisor before an application to conduct drilling operations may be approved. The plan must contain provisions for varying degrees of response effort depending on the severity of the oil spill; identification of available containment and cleanup equipment; notification of responsible persons and alternates in the event of a spill; identification of areas of special biological sensitivity; and specific actions to be taken after the discovery of an oil discharge. Should a spill occur, immediate corrective action must be taken.

Drilling and training classes for familiarization with pollution-control equipment and operational procedures must be conducted on a schedule approved by the Supervisor. The drills must include the deployment of equipment.

Although the emphasis of the OCS Orders is on the prevention of oil spills, it is recognized that spills will occur. It is also recognized that it is not tecnically possible to completely control and mechanically remove all oil that is discharged. The intent of this portion of the Order is to insure the operators have ready access to the best practical control equipment for the area, and for the prevailing conditions, and that personnel are trained to effectively utilize the equipment. The operator's plans must have sufficient flexibility to permit different spill-control strategies for different environmental conditions. This provides for mechanical and chemical measures which best compliment the forces of nature and maximize the protection of biological communities, shoreline resources, and commercial interests.

Gulf of Alaska OCS Order No. 8

This Order sets forth requirements for the design, installation, major modification and repairs, and verification of platforms and structures.

The Order specifies the procedures for the Platform Verification Program, as well as the requirements for verifying the structural integrity of the OCS platforms.

All structural plans must be certified by a registered professional structural engineer or a civil engineer specializing in structural design. Verification of the design, fabrication, installation, and modifications to offshore platforms and structures, will be done by a certified verification agent who is nominated by the lessee.

The Order requires submittal of the design plan to cover design documentation, general platform information, environmental and loading information, foundation and structural information, and the design verification.

For new platforms, or other structures, and for modifications which are subject to review under the requirements of the Platform Verification Program, the lessee shall submit a Fabrication Verification Plan for new platforms or other structures, and for modifications subject to review under the requirements of the Platform Verification Program, the lessee shall submit an Installation Verification Plan subsequent to the submittal of the Fabrication Verification Plan.

Order No. 8 also requires the lessee to compile, retain, and make available for review for the functional life of the platform or other structure that is subject to the provisions of this Order, the as-built structural drawings, the design assumptions and analysis, and a summary of the Non-Destructive Examinations records.

This Order assures careful review of platform design and minimizes the possability of spills and environmental damage resulting from structural failure.

Gulf of Alaska OCS Order No. 12

This Order sets forth requirements for the public availability of data and records concerning offshore petroleum operations. Under the Order, specific types of data and records pertaining to drilling and production operations, well tests, sale of lease production, accidents, inspections, and pollution incidents, are to be available for public inspection. Privileged information, such as certain geological and geophysical data, would be made available for public inspection with the lessee's consent or after a fixed period of time has elapsed. By making operations data available, this Order permits increased public awareness of OCS activities and involvement in OCS programs. Increased public interest and understanding should result in continuing improvements in the safety and pollution-prevention programs of both industry and Government.

APPENDIX D

USGS OILSPILL RISK ANALYSIS

Table 1. -- Oilspill probability estimates for spills greater than 1000 barrels resulting from OCS Lease Sale 60, from existing Federal leases, or from existing oil transportation in the Cook Inlet area.

	Expected number of spills (mean).	Most likely number of spills (mode).	Probability of one or more spills.
Sale 60	4.0	4	0.98
Existing leases	5.0	5	0.99
Sale 60 + existing	9.0	9	0.99+
Deletion alt. A	1.6	1	0.80
Del. alt. A + existing	6.6	6	0.99+
Deletion alt. B	1.3	1	0.71
Del. alt. B + existing	6.2	6	0.99+
Existing tankers	2.0	2	0.87
Sale 60, existing leases, and existing tankers	11.0	11	0.99+

Conditional ·

Table 2. -- Probabilities (expressed in percent chance) that an oilspill starting at a particular location will contact a certain target within 3 days.

	Hypothetical Spill Location																	
Target	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	T1	T2	T3
Land	55	38	47	51	35	25	44	64	47	42	46	34	13	12	45	62	57	50
Seabird, S., Apr-Sep	31	16	11	9	4	1	3	2	2	1	1	1	n	n	n	37	42	31
Seabird, S., Oct-Mar	47	35	31	16	10	7	11	9	9	5	4	1	1	n	n	45	44	44
Seabird, N., Apr-Sep	1	26	26	15	50	50	30	6	13	17	13	15	37	24	5	n	n	4
Seabird, N., Oct-Mar	n	16	12	3	50	50	26	n	9	17	12	19	41	22	6	n	n	n
Sea otter, area A	n	n	n	n	1	3	n	n	n	n	n	n	8	n	n	n	n	n
Sea otter, area B	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n
Sea otter, area C	n	3	16	6	12	4	5	1	1	1	n	n	1	n	n	n	n	1
Sea otter, area D	32	23	16	10	5	2	3	n	1	n	n	n	n	n	n	14	18	22
Sea otter, area E	1	2	6	5	2	1	2	1	2	1	1	n	n	1	1	7	8	2
Sea otter, area F	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n
Sea otter, area G	n	n	n	n	1	6	n	n	n	n	n	n	17	1	n	n	n	n
Sea otter, area H	n	2	7	30	23	19	32	38	33	29	26	18	4	10	15	2	1	1
Red River salmon	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n
Karluk River salmon	2	n	n	n	n	n	n	n	n	n	n	n	n	n	n	3	2	1
Rocky, All., Grassy	13	4	3	2	n	n	1	n	n	n	n	n	n	n	n	2	1	9
Dark, Sent., Latax	2	8	1	3	1	1	1	n	n	n	n	n	n	n	n	n	n	3
Barren Islands	n	5	18	7	15	6	6	2	3	1	n	n	1	n	n	n	n	1
Augustine Island	n	n	n	3	7	4	15	39	30	25	24	19	10	13	15	n	n	n
Kiukpalik, Shakun	2	1	5	3	1	n	n	1	1	n	n	n	n	n	n	11	10	3

Target	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14	T15	T16	T17	T18	T19	T20	T21
Land	41	31	23	32	35	27	42	10	16	39	53	64	38	27	63	8	4	5
Seabird, S., Apr-Sep	10	3	n	n	n	1	n	n	n	n	n	30	1	n	50	n	n	n
Seabird, S., Oct-Mar	29	10	1	1	2	4	1	n	n	n	n	34	9	n	50	n	n	n
Seabird, N., Apr-Sep	18	43	18	28	51	50	36	25	6	1	1	1	51	19	n	n	6	1
Seabird, N., Oct-Mar	8	42	19	35	50	51	37	27	8	1	1	n	50	29	n	n	8	2
Sea otter, area A	n	1	n	5	5	15	8	3	n	n	n	n	19	4	n	n	1	n
Sea otter, area B	n	n	n	n	5	1	n	n	n	n	n	n	n	n	n	n	3	n
Sea otter, area C	5	3	n	n	17	4	n	n	n	n	n	n	4	n	n	n	2	n
Sea otter, area D	16	2	n	n	2	1	n	n	n	n	n	57	2	n	32	n	1	4
Sea otter, area E	3	1	1	n	1	1	n	1	n	n	n	n	1	n	4	n	n	n
Sea otter, area F	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n
Sea otter, area G	n	1	1	35	11	25	50	2	1	n	1	n	9	22	n	n	n	n
Sea otter, area H	10	22	14	4	13	7	2	5	2	1	1	n	16	2	n	n	n	n
Red River salmon	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n
Karluk River salmon	n	n	n	n	n	n	n	n	n	n	n	n	n	n	2	n	n	n
Rocky, All., Grassy	3	1	n	n	n	n	n	n	n	n	n	49	n	n	n	n	n	n
Dark, Sent., Latax	6	n	n	n	1	n	n	n	n	n	n	1	n	n	n	n	n	n
Barren Islands	6	4	n	n	28	5	n	n	n	n	n	n	7	n	n	n	3	1
Augustine Island	n	11	15	7	1	4	4	8	2	1	1	n	6	6	n	n	n	n
Kiukpalik, Shakun	3	n	n	n	1	n	n	n	n	n	n	1	1	n	6	n	n	n

Note: n = less than 0.5 percent.

Conditional

Table 3. -- Probabilities (expressed in percent chance) that an oilspill starting at a particular location will contact a certain target within 10 days.

	Hypothetical Spill Location																	
Target	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	T1	T2	T3
Land	90	85	89	88	85	86	90	95	91	92	93	91	81	86	93	94	94	90
Seabird, S., Apr-Sep	38	25	18	17	8	5	10	7	7	5	6	6	4	8	8	40	45	38
Seabird, S., Oct-Mar	50	40	39	23	18	19	17	17	20	15	16	14	14	17	13	46	45	47
Seabird, N., Apr-Sep	2	27	28	18	50	50	32	9	16	19	15	19	40	28	7	1	1	6
Seabird, N., Oct-Mar	n	16	12	4	50	50	27	2	11	17	13	20	43	27	8	n	n	n
Sea otter, area A	n	1	1	1	3	6	1	n	n	1	n	2	12	4	n	n	n	1
Sea otter, area B	n	3	1	1	3	2	2	1	1	1	n	1	1	1	n	n	n	n
Sea otter, area C	1	5	17	9	18	7	10	4	6	6	4	4	4	2	3	n	n	1
Sea otter, area D	43	35	26	21	12	10	12	10	11	9	10	9	12	10	7	19	26	32
Sea otter, area E	7	6	8	8	4	2	4	3	4	3	2	3	2	4	2	11	10	7
Sea otter, area F	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n
Sea otter, area G	n	n	n	n	2	11	1	n	n	n	1	2	19	2	n	n	n	n
Sea otter, area H	1	4	11	34	34	34	40	44	39	42	34	36	24	32	26	3	2	3
Red River salmon	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n
Karluk River salmon	4	2	1	1	1	1	1	1	1	n	1	n	n	n	1	4	3	1
Rocky, All., Grassy	14	7	5	5	1	2	2	3	1	3	2	2	2	2	1	3	4	11
Dark, Sent., Latax	3	9	2	4	2	1	4	2	3	2	1	2	2	2	1	n	1	4
Barren Islands	1	7	20	11	20	9	11	4	8	9	5	4	5	4	3	n	n	2
Augustine Island	n	n	1	4	12	11	18	40	33	31	28	27	20	23	20	n	n	n
Kiukpalik, Shakun	9	5	8	5	2	3	3	2	3	1	1	1	2	2	1	15	14	8

Target	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14	T15	T16	T17	T18	T19	T20	T21
Land	88	88	88	88	78	90	88	85	79	83	89	92	89	86	94	18	20	17
Seabird, S., Apr-Sep	21	9	5	3	2	3	2	3	3	2	1	32	5	2	50	n	n	n
Seabird, S., Oct-Mar	36	23	18	12	9	18	11	16	11	5	6	36	22	10	50	n	n	n
Seabird, N., Apr-Sep	20	44	20	31	51	50	36	29	14	8	6	2	51	24	n	1	8	4
Seabird, N., Oct-Mar	8	43	20	37	50	52	38	32	19	11	8	1	50	32	n	3	11	6
Sea otter, area A	n	2	3	7	8	18	12	9	3	1	1	n	19	8	n	n	3	2
Sea otter, area B	1	1	n	n	12	2	1	1	n	n	n	1	2	n	n	1	13	5
Sea otter, area C	9	7	7	4	22	7	4	4	2	1	1	1	10	4	n	1	4	4
Sea otter, area D	30	11	7	8	9	11	5	7	4	4	2	63	12	6	37	2	2	5
Sea otter, area E	5	5	3	1	2	2	1	3	1	1	1	3	3	2	7	n	n	n
Sea otter, area F	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n
Sea otter, area G	n	2	2	37	12	27	52	6	5	1	2	n	9	23	n	n	n	n
Sea otter, area H	14	34	31	20	20	26	17	27	24	16	16	1	25	22	n	n	n	n
Red River salmon	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n
Karluk River salmon	1	n	1	n	n	1	1	1	n	n	n	1	n	n	4	n	n	n
Rocky, All., Grassy	7	3	1	2	1	3	2	1	1	n	n	50	3	1	1	n	n	n
Dark, Sent., Latax	7	3	1	2	3	2	1	1	1	n	n	2	2	1	n	n	n	n
Barren Islands	10	8	7	5	32	9	4	5	3	1	1	1	12	5	n	1	5	5
Augustine Island	1	15	25	14	3	10	12	20	20	13	14	n	9	17	n	n	n	n
Kiukpalik, Shakun	9	2	3	1	2	1	1	2	1	n	n	4	3	1	10	n	n	n

Note: n = less than 0.5 percent.

Conditional

Table 4. -- Probabilities (expressed in percent chance) that an oilspill starting at a particular location will contact a certain target within 30 days.

	Hypothetical Spill Location																	
Target	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	T1	T2	T3
Land	99	96	97	98	98	99	99	99	99	99	99	99	99	99	**	**	99	99
Seabird, S., Apr-Sep	38	25	19	17	9	5	10	7	7	5	7	6	5	8	8	40	46	38
Seabird, S., Oct-Mar	50	40	39	23	19	19	17	17	20	15	16	15	16	18	13	46	45	47
Seabird, N., Apr-Sep	4	28	28	18	50	50	32	9	17	20	15	19	40	28	8	1	2	6
Seabird, N., Oct-Mar	n	16	12	4	50	50	27	2	11	17	13	20	44	27	8	n	n	n
Sea otter, area A	1	1	1	1	3	7	2	1	1	1	n	2	13	5	n	n	n	1
Sea otter, area B	1	4	2	2	6	4	3	1	2	2	1	1	2	2	1	n	n	1
Sea otter, area C	2	6	18	10	18	9	11	4	7	7	5	4	4	3	3	1	n	2
Sea otter, area D	44	36	26	22	13	11	13	10	11	10	11	10	16	12	8	20	27	33
Sea otter, area E	7	7	8	8	4	2	5	4	5	3	2	3	4	4	2	11	10	7
Sea otter, area F	n	n	n	1	n	n	n	n	n	n	n	n	n	n	n	n	1	n
Sea otter, area G	n	n	n	n	2	11	1	n	n	1	1	2	20	3	n	n	n	n
Sea otter, area H	1	5	12	34	34	36	40	44	39	42	35	37	25	34	27	3	2	3
Red River salmon	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n
Karluk River salmon	4	2	1	1	1	1	1	1	1	n	1	n	n	1	1	4	3	1
Rocky, All., Grassy	14	7	5	5	1	2	2	3	1	3	2	2	3	2	1	3	4	12
Dark, Sent., Latax	4	9	3	4	2	2	4	2	3	2	1	2	3	2	1	1	1	4
Barren Islands	2	9	21	11	21	11	12	5	9	9	5	5	5	5	4	1	n	2
Augustine Island	n	1	1	4	12	11	18	40	33	31	28	27	21	24	21	n	n	n
Kiukpalik, Shakun	9	6	8	6	3	3	4	3	3	1	1	1	2	2	2	15	14	9

Target	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14	T15	T16	T17	T18	T19	T20	T21
Land	98	99	99	99	94	98	99	99	99	94	**	**	99	**	**	36	37	37
Seabird, S., Apr-Sep	22	9	5	3	2	3	3	4	4	2	1	32	5	3	50	n	n	n
Seabird, S., Oct-Mar	36	23	18	13	10	18	11	16	13	6	6	36	22	11	50	n	n	n
Seabird, N., Apr-Sep	20	44	21	31	51	50	36	30	14	8	8	3	51	24	1	4	9	6
Seabird, N., Oct-Mar	8	43	21	37	51	52	39	32	20	11	8	1	50	32	n	4	12	8
Sea otter, area A	1	4	4	7	9	19	15	11	4	1	3	1	20	9	n	1	4	3
Sea otter, area B	3	3	2	1	16	3	2	1	1	1	1	2	3	2	n	4	18	8
Sea otter, area C	9	8	8	4	22	8	4	6	3	2	2	1	10	4	n	3	5	6
Sea otter, area D	30	12	7	9	10	12	6	7	7	5	3	64	13	8	37	2	2	7
Sea otter, area E	6	5	4	2	2	3	2	4	2	1	1	3	4	2	7	n	n	n
Sea otter, area F	n	n	n	n	n	n	n	n	n	n	n	n	n	n	1	3	1	2
Sea otter, area G	n	2	3	38	12	27	52	7	6	1	3	n	9	24	n	n	n	n
Sea otter, area H	15	35	32	21	21	26	18	28	26	18	17	2	26	23	n	1	n	n
Red River salmon	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n
Karluk River salmon	1	1	1	n	1	1	1	1	1	n	n	1	1	1	4	n	n	n
Rocky, All., Grassy	7	3	1	3	2	3	2	1	1	n	n	50	4	1	1	n	n	n
Dark, Sent., Latax	7	3	1	2	3	2	1	1	1	1	1	2	2	2	n	1	1	1
Barren Islands	11	9	8	5	33	10	5	7	4	2	2	1	12	5	n	4	6	7
Augustine Island	1	16	25	15	3	10	12	20	21	15	14	n	9	17	n	1	n	n
Kiukpalik, Shakun	9	2	3	1	2	2	1	3	2	n	1	5	3	2	10	n	n	n

Note: n = less than 0.5 percent.
** = greater than 99.5 percent.

Conditional

Table 5. -- Probabilities (expressed in percent chance) that an oilspill starting at a particular location will contact a certain land segment within 3 days.

Land	Hypothetical Spill Location																																		
Segment	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14	T15	T16	T17	T18	T19	T20	T21
11	1	n	n	n	n	n	n	n	n	n	n	n	n	n	n	2	2	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	3	n	n	n
12	1	n	n	n	n	n	n	n	n	n	n	n	n	n	n	6	4	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	1	n	n	n
13	4	1	2	2	1	n	2	1	n	n	n	n	n	n	n	4	3	7	2	1	n	n	n	n	n	n	n	n	n	2	n	n	9	n	n	n
14	3	2	3	3	2	n	2	n	n	n	n	n	n	n	n	1	2	2	3	1	n	n	n	n	n	n	n	n	n	1	1	n	5	n	n	n
15	7	4	4	1	1	n	n	n	n	n	n	n	n	n	n	4	5	1	2	n	n	n	n	n	n	n	n	n	n	4	n	n	23	n	n	n
16	5	3	1	1	n	n	n	n	n	n	n	n	n	n	n	2	5	1	2	n	n	n	n	n	n	n	n	n	n	4	n	n	n	n	n	n
17	17	9	4	4	n	1	n	n	n	n	n	n	n	n	n	3	1	12	5	n	n	n	1	n	n	n	n	n	n	45	1	n	n	n	n	n
18	n	2	1	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	1	n	n	n	1	n	n	n	n	n	n	n	n	n	n	n	n	1
20	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	1
21	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	2
22	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	1	n	1
23	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	2	n	n
24	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	3	n	n
26	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	2	n	n
27	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	1	n	n
40	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	1	n	n	n
41	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	1	n	n	n
42	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	3	n	n	n
43	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	1	n	n	n
44	n	n	1	n	n	n	n	n	n	n	n	n	n	n	n	n	1	1	n	n	n	n	n	n	n	n	n	n	n	2	n	n	5	n	n	n
45	16	13	5	2	1	n	n	1	n	n	n	n	n	n	n	27	22	21	9	1	n	n	n	n	n	n	n	n	n	6	n	n	7	n	n	n
46	2	2	4	1	n	n	n	1	n	n	n	n	n	n	n	3	4	1	1	n	n	n	n	n	n	n	n	n	n	1	n	n	1	n	n	n
47	n	n	1	n	n	n	n	n	n	n	n	n	n	n	n	1	1	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	1	n	n	n
48	1	n	2	n	n	n	1	n	1	n	n	n	n	n	n	6	5	1	1	n	n	n	n	n	n	n	n	n	n	1	n	n	4	n	n	n
49	1	1	3	2	2	n	n	n	n	n	n	n	n	n	n	4	4	1	2	1	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n
50	n	n	2	7	2	n	1	1	n	1	n	1	n	n	n	n	n	n	4	1	n	n	2	n	n	n	n	n	n	n	1	n	n	n	n	n
51	n	n	n	2	1	n	n	n	n	1	n	n	n	n	n	n	n	n	1	n	n	n	1	n	n	n	n	n	n	n	n	n	n	n	n	n
53	n	1	3	15	6	4	2	1	1	2	1	n	n	n	n	n	n	n	3	6	n	n	7	1	n	n	n	n	n	n	3	n	n	n	n	n
54	n	n	n	4	7	11	16	3	8	12	6	3	3	1	1	n	n	n	2	8	3	2	3	4	1	2	n	n	n	n	7	1	n	n	n	n
55	n	n	n	n	n	n	n	3	1	n	1	n	n	n	1	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n
56	n	n	n	2	4	2	9	29	21	13	15	12	1	7	11	n	n	n	n	5	11	1	n	1	1	2	2	n	1	n	2	1	n	n	n	n
57	n	n	n	n	n	n	1	2	n	n	n	1	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n
58	n	n	n	n	1	n	3	21	3	1	3	3	n	n	5	n	n	n	n	1	2	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n
59	n	n	n	n	n	n	2	n	8	2	5	1	n	n	4	n	n	n	n	1	n	n	n	n	n	n	n	n	n	n	1	n	n	n	n	n
60	n	n	n	n	1	1	3	1	3	9	13	10	1	1	7	n	n	n	n	2	2	n	n	n	n	1	n	n	n	n	2	n	n	n	n	n
61	n	n	n	n	n	n	n	n	n	2	2	2	1	n	6	n	n	n	n	1	1	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n
62	n	n	n	n	n	n	n	n	n	n	1	1	n	n	6	n	n	n	n	n	2	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n
63	n	n	n	n	n	n	n	n	n	n	n	1	n	n	6	n	n	n	n	n	2	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n
64	n	n	n	n	n	n	n	n	n	n	n	1	2	3	n	n	n	n	n	n	2	n	n	n	n	4	10	21	3	n	n	1	n	n	n	n
66	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	1	n	n	n	n	n	n	n	n
67	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	6	n	n	n	n	n	n	n	n
69	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	2	n	n	n	n	n	n	n	n
70	n	n	n	n	n	n	n	n	n	n	n	n	2	n	n	n	n	n	n	n	n	1	n	n	n	1	3	7	22	n	n	1	n	n	n	n
71	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	2	20	n	n	1	n	n	n	n
72	n	n	n	n	n	n	n	n	n	n	n	n	1	n	n	n	n	n	n	n	n	1	n	n	1	n	n	1	1	n	n	2	n	n	n	n
73	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	1	1	n	n	n	5	n	n	2	n	n	n	n

Conditional

Table 6. -- Probabilities (expressed in percent chance) that an oilspill starting at a particular location will contact a certain land segment within 10 days.

Land Segment	Hypothetical Spill Location P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14	T15	T16	T17	T18	T19	T20	T21
9	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	1	n	1	n	n	n	n	n	n	n	n	n	n	n	n	n	n	1	n	n	n
10	1	1	n	n	n	n	n	1	n	n	1	n	n	n	n	1	1	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	1	n	n	n
11	2	1	1	n	1	1	n	1	n	n	n	1	n	n	n	3	3	1	1	1	1	n	n	1	1	1	n	n	n	n	n	n	4	n	n	n
12	2	1	2	1	1	n	1	1	1	1	1	1	n	1	n	6	5	3	1	2	2	1	n	1	n	1	1	n	1	1	2	n	2	n	n	n
13	5	3	3	4	2	2	3	3	3	3	3	3	2	2	4	5	5	9	4	4	2	2	n	2	2	2	2	1	1	4	2	1	10	n	n	n
14	5	3	3	4	4	2	3	2	3	1	2	2	2	3	2	2	3	4	5	3	2	1	n	1	1	2	2	1	1	2	2	1	6	n	n	n
15	10	7	8	3	2	3	3	2	2	2	2	2	2	3	1	8	9	4	7	2	2	2	1	3	1	2	1	1	1	5	3	1	25	n	n	n
16	6	4	5	2	3	3	1	2	2	1	2	1	2	1	1	4	8	3	3	1	2	1	2	2	2	1	n	n	n	6	1	1	2	n	n	n
17	22	14	6	8	2	2	3	4	3	4	3	3	4	4	2	4	5	16	12	3	2	3	5	3	2	2	1	2	n	47	3	2	2	n	n	n
18	n	3	2	1	n	n	1	n	1	n	n	n	n	1	n	n	n	1	1	2	n	n	2	1	n	n	n	n	n	n	1	1	n	n	1	1
20	n	n	n	1	n	n	n	n	n	n	n	n	n	n	n	n	n	n	1	n	n	1	n	n	n	n	n	n	n	n	n	n	n	n	1	1
21	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	1	n	2
22	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	2	n	2
23	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	4	n	n
24	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	4	n	n
26	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	2	n	n
27	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	2	n	1
29	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	1	n
32	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	1	n	n
37	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	1	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n
38	n	n	n	n	1	n	n	n	1	n	n	n	n	n	n	2	1	n	n	n	n	n	n	n	n	n	n	n	n	1	n	n	1	n	n	n
39	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	1	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n
40	1	1	1	n	1	n	n	1	n	n	1	1	n	n	n	1	1	1	n	n	n	1	n	n	n	n	n	n	n	n	1	n	2	n	n	n
41	1	2	1	2	1	n	n	n	n	1	n	n	n	n	n	1	2	2	n	1	n	n	n	1	n	1	n	n	n	2	1	n	5	n	n	n
42	2	1	1	1	1	n	1	1	1	1	1	n	n	n	1	1	1	2	1	n	1	n	n	1	n	n	n	n	n	3	1	n	4	n	n	n
43	1	n	2	1	n	n	n	1	1	n	n	n	n	1	1	2	3	1	2	1	1	n	n	1	1	n	n	n	n	2	n	1	3	n	n	n
44	2	3	4	3	1	2	1	2	1	1	1	1	1	1	1	2	4	2	2	2	2	1	n	1	n	1	n	1	n	4	1	1	7	n	n	n
45	19	21	10	5	3	5	5	4	4	4	3	3	2	5	4	30	26	25	14	7	3	2	2	3	2	3	2	1	1	9	4	2	10	n	n	n
46	3	5	6	2	2	1	1	2	2	1	1	1	1	2	1	4	4	4	3	2	1	1	1	1	1	1	n	n	n	1	2	1	2	n	n	n
47	2	1	2	1	1	1	1	n	n	1	n	1	n	1	n	3	2	2	2	n	n	n	n	n	n	1	n	n	n	2	n	n	2	n	n	n
48	4	3	4	2	1	1	2	1	1	n	1	n	1	1	1	8	8	4	2	1	1	n	1	1	n	1	n	n	n	2	1	1	6	n	n	n
49	3	3	6	4	2	n	2	2	1	1	1	1	1	2	1	7	4	5	6	1	1	1	1	1	n	1	n	n	n	1	2	1	1	n	n	n
50	n	n	2	7	3	1	1	1	1	1	1	2	1	2	1	n	n	n	4	1	n	n	3	2	1	1	1	n	n	n	1	1	n	n	n	n
51	n	n	n	2	1	n	1	n	n	1	1	1	1	1	1	n	n	n	2	1	1	n	1	n	n	n	n	n	n	n	n	n	n	n	n	n
53	n	2	5	19	9	8	5	3	3	6	2	5	2	4	3	n	n	1	4	10	4	3	10	3	3	2	1	3	1	n	7	2	n	n	n	n
54	n	n	1	5	12	19	20	4	11	15	11	9	13	11	5	n	n	n	3	13	9	11	5	14	7	12	6	3	4	1	10	9	n	n	n	n
55	n	n	n	n	n	1	1	4	2	2	1	1	n	n	2	n	n	n	n	1	1	n	n	n	n	1	1	n	1	n	n	1	n	n	n	n
56	n	n	n	2	7	6	11	29	22	16	18	17	7	15	14	n	n	n	n	8	16	5	2	5	6	11	14	10	9	n	6	9	n	n	n	n
57	n	n	n	n	1	n	1	3	n	1	1	1	n	1	n	n	n	n	n	n	1	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n
58	n	n	1	n	2	1	5	22	6	3	5	5	2	2	6	n	n	n	n	2	5	1	1	2	1	2	3	2	1	n	1	2	n	n	n	n
59	n	n	n	n	3	1	3	1	10	6	6	2	2	3	7	n	n	n	n	3	1	2	1	1	1	1	4	3	n	n	2	1	n	n	n	n
60	n	n	1	n	2	3	5	2	4	11	16	12	2	4	9	n	n	n	n	4	4	3	2	1	2	3	3	2	2	n	3	2	n	n	n	n
61	n	n	n	n	1	1	n	n	n	2	3	2	1	2	7	n	n	n	n	1	4	n	1	n	1	2	2	2	1	n	1	1	n	n	n	n
62	n	n	n	n	1	n	n	n	n	1	2	3	1	2	9	n	n	n	n	2	5	2	n	n	n	2	2	2	1	n	1	1	n	n	n	n
63	n	n	n	n	1	2	n	n	n	1	1	5	2	2	7	n	n	n	n	1	5	1	n	1	1	2	2	1	1	n	1	2	n	n	n	n
64	n	n	n	n	2	5	1	n	n	n	n	2	8	7	n	n	n	n	n	1	3	5	1	3	3	11	17	27	8	n	2	7	n	n	n	n

Conditional

Table 7. -- Probabilities (expressed in percent chance) that an oilspill starting at a particular location will contact a certain land segment within 30 days.

Land	Hypothetical Spill Location																																		
Segment	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14	T15	T16	T17	T18	T19	T20	T21
1	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	1	n	1
3	1	n	1	1	n	n	1	n	n	n	n	1	n	n	n	n	n	1	n	n	n	n	n	n	n	n	n	n	n	n	n	n	1	1	n	n
4	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	1	1	1
7	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	1	n	n	n	n	n
8	n	n	n	n	n	n	n	n	n	n	n	n	n	n	1	1	n	n	n	n	n	n	n	n	n	n	n	n	n	n	1	1	n	n	n	n
9	n	n	n	n	n	n	n	1	n	n	n	n	n	n	n	1	1	1	n	1	n	n	n	n	n	n	n	n	n	n	n	n	1	n	n	n
10	1	1	n	1	n	n	n	1	n	1	1	n	n	n	n	1	1	n	n	1	1	n	n	n	n	n	n	n	n	1	n	n	1	n	n	n
11	2	1	1	n	1	1	n	1	1	n	1	1	n	1	n	4	4	1	1	1	1	1	1	1	1	1	1	n	n	n	n	1	4	n	n	n
12	3	2	2	1	1	n	1	1	1	2	2	1	n	1	n	6	5	3	2	2	2	1	1	1	n	1	1	n	1	1	2	n	2	n	n	n
13	5	3	3	4	2	2	3	3	4	3	3	3	2	2	4	6	5	9	4	4	2	3	n	2	2	2	2	1	1	4	2	1	10	n	n	n
14	5	3	3	5	4	2	3	2	3	1	2	2	4	3	2	2	3	4	5	3	2	1	n	1	1	2	3	2	1	2	3	1	6	n	n	n
15	10	7	8	3	2	3	3	2	2	2	3	2	2	3	1	9	9	4	7	3	2	2	1	4	1	2	2	1	2	6	4	2	26	n	n	n
16	7	4	5	3	3	3	1	2	2	2	2	1	3	1	2	4	8	3	3	1	2	1	2	2	2	1	1	n	n	6	1	2	2	n	n	n
17	23	14	6	9	2	2	4	4	3	4	4	4	5	5	2	5	5	17	13	3	2	3	5	4	2	2	1	2	n	48	4	2	2	1	n	1
18	n	3	2	1	1	n	1	n	1	n	n	n	1	1	n	n	n	1	1	2	n	n	2	1	n	n	1	n	n	n	1	1	n	1	1	1
20	n	n	n	1	n	n	n	n	n	n	n	n	n	n	n	n	n	n	1	n	n	1	n	n	n	n	n	n	n	n	1	n	n	n	1	1
21	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	1	n	3
22	n	n	n	n	n	n	n	n	1	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	3	n	3
23	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	4	1	n
24	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	5	1	1
26	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	2	n	1
27	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	3	n	1
28	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	1	1	1
29	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	1	1	2
30	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	1	1	1
32	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	1	n	1
33	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	1	1	1
34	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	2	1	1
35	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	1	1
36	n	n	n	n	n	n	n	n	1	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n
37	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	1	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n
38	n	1	n	n	1	n	n	n	1	n	n	n	n	n	n	2	1	n	n	1	n	n	n	1	n	n	n	n	n	1	1	n	1	n	n	n
39	1	n	1	n	1	n	n	n	n	n	n	n	n	n	n	n	1	1	1	n	n	n	1	1	n	n	n	n	n	n	n	n	1	n	n	n
40	2	1	1	1	1	n	1	1	1	n	1	1	n	n	n	1	1	2	1	n	n	1	n	n	n	n	1	n	n	n	1	n	2	n	n	n
41	1	2	1	2	1	1	n	n	n	1	n	1	n	1	n	1	2	2	n	1	n	n	n	1	1	1	1	n	n	2	1	n	5	n	n	n
42	2	1	1	1	1	n	1	1	1	1	1	1	n	1	1	1	1	2	1	1	2	n	n	1	n	n	1	n	n	3	1	1	4	n	n	n
43	1	n	2	1	1	n	n	1	1	n	n	1	n	1	2	2	3	1	2	2	1	n	n	1	1	n	n	1	1	2	n	1	4	n	n	n
44	2	3	4	3	1	2	2	2	1	1	1	1	2	1	1	2	4	2	2	2	2	2	1	1	1	1	1	2	n	5	1	1	7	n	n	n
45	20	21	10	6	3	6	5	4	4	4	3	3	2	6	4	30	26	26	15	7	3	2	2	4	2	3	3	1	1	9	4	3	10	n	n	n
46	3	5	6	3	3	2	2	2	2	1	2	1	1	3	1	4	4	4	3	2	1	1	1	1	1	2	1	n	1	1	2	1	3	n	n	n
47	2	1	3	1	1	1	1	n	1	1	n	1	n	1	1	3	2	3	3	n	n	n	n	n	n	1	1	n	n	2	1	1	2	n	n	n
48	4	3	4	2	1	1	2	2	1	n	1	1	1	1	1	9	8	4	3	1	1	1	1	1	n	2	1	1	1	3	1	1	6	n	n	n
49	3	4	6	5	3	n	2	2	1	1	1	2	3	2	1	7	5	5	6	2	1	2	1	1	n	2	1	n	n	1	2	1	1	n	n	n
50	n	n	2	7	3	2	2	1	1	2	1	2	1	2	1	n	n	n	4	2	n	n	3	2	1	1	1	1	1	n	1	1	n	n	n	n
51	n	n	n	2	1	n	1	n	n	1	1	1	1	1	1	n	n	n	2	1	1	n	1	n	n	n	n	n	n	n	n	n	n	n	n	n
53	n	2	5	19	9	8	5	3	3	6	2	5	2	4	4	n	n	1	4	10	4	3	10	3	3	2	1	3	1	n	7	2	n	n	n	n

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Table 8. -- Probabilities (expressed in percent chance) of one or more spills, the most likely number of spills, and the expected number of spills occurring and contacting targets over the production life of the proposed lease area.

	------- Within 3 days ---------						------- Within 10 days --------						------- Within 30 days --------					
	Proposed			Existing and Proposed			Proposed			Existing and Proposed			Proposed			Existing and Proposed		
Target	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean
Land	77	1	1.5	95	2	2.9	94	2	2.8	**	6	6.4	96	3	3.3	**	7	7.4
Seabird, S., Apr-Sep	49	0	0.7	54	0	0.8	54	0	0.8	66	1	1.1	55	0	0.8	67	1	1.1
Seabird, S., Oct-Mar	57	0	0.8	69	1	1.2	63	0	1.0	83	1	1.8	63	1	1.0	83	1	1.8
Seabird, N., Apr-Sep	35	0	0.4	84	1	1.8	38	0	0.5	86	1	1.9	40	0	0.5	86	1	2.0
Seabird, N., Oct-Mar	33	0	0.4	83	1	1.8	36	0	0.4	85	1	1.9	37	0	0.5	85	1	1.9
Sea otter, area A	3	0	0.0	12	0	0.1	5	0	0.1	20	0	0.2	8	0	0.1	26	0	0.3
Sea otter, area B	1	0	0.0	6	0	0.1	8	0	0.1	25	0	0.3	13	0	0.1	38	0	0.5
Sea otter, area C	5	0	0.1	22	0	0.3	11	0	0.1	39	0	0.5	14	0	0.2	44	0	0.6
Sea otter, area D	35	0	0.4	42	0	0.6	48	0	0.7	68	1	1.1	50	0	0.7	70	1	1.2
Sea otter, area E	8	0	0.1	12	0	0.1	17	0	0.2	27	0	0.3	17	0	0.2	29	0	0.3
Sea otter, area F	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	4	0	0.0	5	0	0.0
Sea otter, area G	12	0	0.1	37	0	0.5	13	0	0.1	40	0	0.5	13	0	0.1	41	0	0.5
Sea otter, area H	22	0	0.2	60	0	0.9	33	0	0.4	77	1	1.5	35	0	0.4	79	1	1.5
Red River salmon	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
Karluk River salmon	3	0	0.0	3	0	0.0	6	0	0.1	7	0	0.1	6	0	0.1	9	0	0.1
Rocky, All., Grassy	6	0	0.1	7	0	0.1	10	0	0.1	17	0	0.2	10	0	0.1	18	0	0.2
Dark, Sent., Latax	3	0	0.0	4	0	0.0	6	0	0.1	14	0	0.1	7	0	0.1	16	0	0.2
Barren Islands	7	0	0.1	29	0	0.3	14	0	0.1	46	0	0.6	17	0	0.2	50	0	0.7
Augustine Island	11	0	0.1	41	0	0.5	16	0	0.2	53	0	0.7	17	0	0.2	54	0	0.8
Kiukpalik, Shakun	11	0	0.1	13	0	0.1	19	0	0.2	26	0	0.3	19	0	0.2	27	0	0.3

Note: n = less than 0.5 percent; ** = greater than 99.5 percent.

Final

Table 9. -- Probabilities (expressed in percent chance) of one or more spills, the most likely number of spills, and the expected number of spills occurring and contacting targets over the production life of the proposed lease area, deletion alternative IV.

Target	------- Within 3 days ---------						------- Within 10 days --------						------- Within 30 days --------					
	Proposed			Existing and Proposed			Proposed			Existing and Proposed			Proposed			Existing and Proposed		
	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean
Land	38	0	0.5	85	1	1.9	69	1	1.2	99	4	4.7	74	1	1.4	**	5	5.5
Seabird, S., Apr-Sep	5	0	0.1	15	0	0.2	12	0	0.1	34	0	0.4	12	0	0.1	35	0	0.4
Seabird, S., Oct-Mar	13	0	0.1	38	0	0.5	23	0	0.3	65	1	1.0	23	0	0.3	65	1	1.0
Seabird, N., Apr-Sep	34	0	0.4	84	1	1.8	36	0	0.4	85	1	1.9	36	0	0.4	85	1	1.9
Seabird, N., Oct-Mar	32	0	0.4	83	1	1.8	33	0	0.4	84	1	1.8	34	0	0.4	85	1	1.9
Sea otter, area A	3	0	0.0	12	0	0.1	5	0	0.0	19	0	0.2	6	0	0.1	25	0	0.3
Sea otter, area B	1	0	0.0	6	0	0.1	7	0	0.1	25	0	0.3	10	0	0.1	35	0	0.4
Sea otter, area C	5	0	0.1	22	0	0.3	10	0	0.1	38	0	0.5	11	0	0.1	42	0	0.5
Sea otter, area D	6	0	0.1	17	0	0.2	17	0	0.2	48	0	0.7	18	0	0.2	50	0	0.7
Sea otter, area E	2	0	0.0	6	0	0.1	5	0	0.1	18	0	0.2	6	0	0.1	19	0	0.2
Sea otter, area F	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
Sea otter, area G	10	0	0.1	36	0	0.4	11	0	0.1	39	0	0.5	11	0	0.1	40	0	0.5
Sea otter, area H	20	0	0.2	59	0	0.9	29	0	0.3	76	1	1.4	30	0	0.4	77	1	1.5
Red River salmon	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0
Karluk River salmon	n	0	0.0	n	0	0.0	1	0	0.0	3	0	0.0	1	0	0.0	3	0	0.0
Rocky, All., Grassy	1	0	0.0	3	0	0.0	4	0	0.0	12	0	0.1	4	0	0.0	12	0	0.1
Dark, Sent., Latax	2	0	0.0	4	0	0.0	4	0	0.0	12	0	0.1	4	0	0.0	14	0	0.1
Barren Islands	7	0	0.1	29	0	0.3	12	0	0.1	45	0	0.6	14	0	0.1	48	0	0.7
Augustine Island	9	0	0.1	40	0	0.5	13	0	0.1	51	0	0.7	14	0	0.1	52	0	0.7
Kiukpalik, Shakun	1	0	0.0	4	0	0.0	4	0	0.0	12	0	0.1	4	0	0.0	13	0	0.1

Note: n = less than 0.5 percent; ** = greater than 99.5 percent.

Final

Table 10. -- Probabilities (expressed in percent chance) of one or more spills, the most likely number of spills, and the expected number of spills occurring and contacting targets over the production life of the proposed lease area, deletion alternative V.

	------- Within 3 days			---------			------- Within 10 days			--------			------- Within 30 days			--------		
	Proposed			Existing and Proposed			Proposed			Existing and Proposed			Proposed			Existing and Proposed		
Target	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean
Land	32	0	0.4	83	1	1.8	59	0	0.9	99	4	4.5	65	1	1.0	99	5	5.2
Seabird, S., Apr-Sep	3	0	0.0	13	0	0.1	8	0	0.1	32	0	0.4	8	0	0.1	32	0	0.4
Seabird, S., Oct-Mar	[illegible]	0	0.1	35	0	0.4	17	0	0.2	61	0	1.0	17	0	0.2	62	0	1.0
Seabird, N., Apr-Sep	27	0	0.3	82	1	1.7	29	0	0.3	84	1	1.8	29	0	0.3	84	1	1.8
Seabird, N., Oct-Mar	26	0	0.3	81	1	1.7	27	0	0.3	83	1	1.8	28	0	0.3	83	1	1.8
Sea otter, area A	2	0	0.0	11	0	0.1	4	0	0.0	18	0	0.2	5	0	0.1	24	0	0.3
Sea otter, area B	1	0	0.0	5	0	0.1	5	0	0.1	23	0	0.3	8	0	0.1	33	0	0.4
Sea otter, area C	4	0	0.0	22	0	0.2	8	0	0.1	37	0	0.5	9	0	0.1	40	0	0.5
Sea otter, area D	3	0	0.0	14	0	0.2	11	0	0.1	44	0	0.6	12	0	0.1	47	0	0.6
Sea otter, area E	1	0	0.0	6	0	0.1	4	0	0.0	17	0	0.2	4	0	0.0	18	0	0.2
Sea otter, area F	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
Sea otter, area G	8	0	0.1	34	0	0.4	9	0	0.1	38	0	0.5	9	0	0.1	38	0	0.5
Sea otter, area H	18	0	0.2	58	0	0.9	26	0	0.3	75	1	1.4	26	0	0.3	76	1	1.4
Red River salmon	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0
Karluk River salmon	n	0	0.0	n	0	0.0	n	0	0.0	2	0	0.0	1	0	0.0	3	0	0.0
Rocky, All., Grassy	1	0	0.0	2	0	0.0	3	0	0.0	10	0	0.1	3	0	0.0	11	0	0.1
Dark, Sent., Latax	1	0	0.0	3	0	0.0	3	0	0.0	11	0	0.1	3	0	0.0	12	0	0.1
Barren Islands	5	0	0.1	28	0	0.3	10	0	0.1	44	0	0.6	11	0	0.1	46	0	0.6
Augustine Island	9	0	0.1	39	0	0.5	12	0	0.1	50	0	0.7	12	0	0.1	51	0	0.7
Kiukpalik, Shakun	1	0	0.0	3	0	0.0	2	0	0.0	11	0	0.1	3	0	0.0	12	0	0.1

Note: n = less than 0.5 percent.

Final

Table 11. -- Probabilities (expressed in percent chance) of one or more spills, the most likely number of spills, and the expected number of spills occurring and contacting targets over the production life of the proposed lease area, transportation alternative A.

Target	Within 3 days						Within 10 days						Within 30 days					
	Proposed			Existing and Proposed			Proposed			Existing and Proposed			Proposed			Existing and Proposed		
	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean
Land	72	1	1.3	93	2	2.7	95	2	2.9	**	6	6.5	97	3	3.4	**	7	7.6
Seabird, S., Apr-Sep	28	0	0.3	36	0	0.4	39	0	0.5	55	0	0.8	39	0	0.5	55	0	0.8
Seabird, S., Oct-Mar	42	0	0.5	59	0	0.9	55	0	0.8	79	1	1.6	56	0	0.8	80	1	1.6
Seabird, N., Apr-Sep	51	0	0.7	88	2	2.1	55	0	0.8	90	2	2.3	56	0	0.8	90	2	2.3
Seabird, N., Oct-Mar	52	0	0.7	88	2	2.1	55	0	0.8	89	2	2.2	56	0	0.8	90	2	2.3
Sea otter, area A	7	0	0.1	15	0	0.2	12	0	0.1	25	0	0.3	15	0	0.2	32	0	0.4
Sea otter, area B	3	0	0.0	7	0	0.1	14	0	0.2	31	0	0.4	21	0	0.2	43	0	0.6
Sea otter, area C	8	0	0.1	25	0	0.3	17	0	0.2	44	0	0.6	20	0	0.2	48	0	0.6
Sea otter, area D	22	0	0.2	31	0	0.4	40	0	0.5	62	0	1.0	42	0	0.5	65	1	1.0
Sea otter, area E	6	0	0.1	10	0	0.1	15	0	0.2	26	0	0.3	16	0	0.2	28	0	0.3
Sea otter, area F	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	2	0	0.0
Sea otter, area G	19	0	0.2	42	0	0.5	21	0	0.2	46	0	0.6	21	0	0.2	47	0	0.6
Sea otter, area H	28	0	0.3	63	1	1.0	47	0	0.6	82	1	1.7	49	0	0.7	83	1	1.8
Red River salmon	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
Karluk River salmon	1	0	0.0	1	0	0.0	4	0	0.0	5	0	0.1	4	0	0.0	7	0	0.1
Rocky, All., Grassy	6	0	0.1	8	0	0.1	11	0	0.1	18	0	0.2	11	0	0.1	19	0	0.2
Dark, Sent., Latax	4	0	0.0	5	0	0.1	8	0	0.1	16	0	0.2	9	0	0.1	18	0	0.2
Barren Islands	11	0	0.1	33	0	0.4	22	0	0.2	51	0	0.7	25	0	0.3	55	0	0.8
Augustine Island	16	0	0.2	44	0	0.6	27	0	0.3	59	0	0.9	27	0	0.3	60	0	0.9
Kiukpalik, Shakun	7	0	0.1	9	0	0.1	14	0	0.2	22	0	0.2	15	0	0.2	24	0	0.3

Note: n = less than 0.5 percent; ** = greater than 99.5 percent.

Final

Table 12. -- Probabilities (expressed in percent chance) of one or more spills, the most likely number of spills, and the expected number of spills occurring and contacting targets over the production life of the proposed lease area, transportation alternative B.

	Within 3 days						Within 10 days						Within 30 days					
	Proposed			Existing and Proposed			Proposed			Existing and Proposed			Proposed			Existing and Proposed		
Target	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean
Land	72	1	1.3	93	2	2.7	94	2	2.8	**	6	6.4	96	3	3.3	**	7	7.4
Seabird, S., Apr-Sep	29	0	0.3	36	0	0.5	40	0	0.5	55	0	0.8	40	0	0.5	56	0	0.8
Seabird, S., Oct-Mar	45	0	0.6	61	0	0.9	57	0	0.8	80	1	1.6	57	0	0.8	80	1	1.6
Seabird, N., Apr-Sep	57	0	0.8	89	2	2.2	59	0	0.9	91	2	2.4	60	0	0.9	91	2	2.4
Seabird, N., Oct-Mar	54	0	0.8	88	2	2.2	57	0	0.8	90	2	2.3	57	0	0.9	90	2	2.3
Sea otter, area A	12	0	0.1	20	0	0.2	15	0	0.2	28	0	0.3	18	0	0.2	34	0	0.4
Sea otter, area B	4	0	0.0	8	0	0.1	18	0	0.2	33	0	0.4	25	0	0.3	46	0	0.6
Sea otter, area C	11	0	0.1	27	0	0.3	20	0	0.2	46	0	0.6	23	0	0.3	50	0	0.7
Sea otter, area D	23	0	0.3	32	0	0.4	41	0	0.5	63	0	1.0	43	0	0.6	66	1	1.1
Sea otter, area E	6	0	0.1	11	0	0.1	15	0	0.2	26	0	0.3	16	0	0.2	28	0	0.3
Sea otter, area F	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	2	0	0.0
Sea otter, area G	7	0	0.1	33	0	0.4	8	0	0.1	37	0	0.5	8	0	0.1	38	0	0.5
Sea otter, area H	33	0	0.4	66	1	1.1	45	0	0.6	82	1	1.7	46	0	0.6	82	1	1.7
Red River salmon	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
Karluk River salmon	1	0	0.0	1	0	0.0	3	0	0.0	5	0	0.1	4	0	0.0	6	0	0.1
Rocky, All., Grassy	6	0	0.1	8	0	0.1	12	0	0.1	19	0	0.2	12	0	0.1	20	0	0.2
Dark, Sent., Latax	4	0	0.0	6	0	0.1	8	0	0.1	16	0	0.2	9	0	0.1	18	0	0.2
Barren Islands	16	0	0.2	36	0	0.4	26	0	0.3	54	0	0.8	28	0	0.3	57	0	0.8
Augustine Island	14	0	0.2	43	0	0.6	20	0	0.2	55	0	0.8	21	0	0.2	56	0	0.8
Kiukpalik, Shakun	7	0	0.1	10	0	0.1	15	0	0.2	22	0	0.3	16	0	0.2	24	0	0.3

Note: n = less than 0.5 percent; ** = greater than 99.5 percent.

Final

Table 13. -- Probabilities (expressed in percent chance) of one or more spills, the most likely number of spills, and the expected number of spills occurring and contacting targets over the production life of the proposed lease area, transportation alternative C.

	------- Within 3 days ---------						------- Within 10 days --------						------- Within 30 days --------					
	Proposed			Existing and Proposed			Proposed			Existing and Proposed			Proposed			Existing and Proposed		
Target	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean
Land	78	1	1.5	95	2	2.9	93	2	2.7	**	6	6.3	96	3	3.2	**	7	7.4
Seabird, S., Apr-Sep	47	0	0.6	53	0	0.7	55	0	0.8	66	1	1.1	55	0	0.8	67	1	1.1
Seabird, S., Oct-Mar	59	0	0.9	71	1	1.2	64	1	1.0	83	1	1.8	64	1	1.0	83	1	1.8
Seabird, N., Apr-Sep	21	0	0.2	81	1	1.6	28	0	0.3	83	1	1.8	31	0	0.4	84	1	1.8
Seabird, N., Oct-Mar	15	0	0.2	79	1	1.5	21	0	0.2	81	1	1.7	23	0	0.3	82	1	1.7
Sea otter, area A	n	0	0.0	9	0	0.1	3	0	0.0	18	0	0.2	6	0	0.1	24	0	0.3
Sea otter, area B	n	0	0.0	4	0	0.0	7	0	0.1	25	0	0.3	14	0	0.1	38	0	0.5
Sea otter, area C	4	0	0.0	21	0	0.2	12	0	0.1	40	0	0.5	16	0	0.2	45	0	0.6
Sea otter, area D	53	0	0.8	58	0	0.9	63	0	1.0	77	1	1.5	65	1	1.0	79	1	1.5
Sea otter, area E	6	0	0.1	10	0	0.1	15	0	0.2	26	0	0.3	16	0	0.2	28	0	0.3
Sea otter, area F	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	3	0	0.0	4	0	0.0
Sea otter, area G	n	0	0.0	29	0	0.3	1	0	0.0	32	0	0.4	1	0	0.0	33	0	0.4
Sea otter, area H	17	0	0.2	58	0	0.9	25	0	0.3	75	1	1.4	26	0	0.3	76	1	1.4
Red River salmon	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
Karluk River salmon	2	0	0.0	2	0	0.0	4	0	0.0	6	0	0.1	4	0	0.0	7	0	0.1
Rocky, All., Grassy	35	0	0.4	36	0	0.4	38	0	0.5	43	0	0.6	38	0	0.5	44	0	0.6
Dark, Sent., Latax	5	0	0.0	6	0	0.1	8	0	0.1	16	0	0.2	9	0	0.1	18	0	0.2
Barren Islands	5	0	0.1	28	0	0.3	14	0	0.2	46	0	0.6	18	0	0.2	51	0	0.7
Augustine Island	7	0	0.1	38	0	0.5	9	0	0.1	49	0	0.7	9	0	0.1	50	0	0.7
Kiukpalik, Shakun	8	0	0.1	11	0	0.1	18	0	0.2	25	0	0.3	19	0	0.2	27	0	0.3

Note: n = less than 0.5 percent; ** = greater than 99.5 percent.

Final

Table 14. -- Probabilities (expressed in percent chance) of one or more spills, the most likely number of spills, and the expected number of spills occurring and contacting land segments over the production life of the proposed lease area.

Land Segment	------- Within 3 days ---------						------- Within 10 days --------						------- Within 30 days --------					
	Proposed			Existing and Proposed			Proposed			Existing and Proposed			Proposed			Existing and Proposed		
	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean
3	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	2	0	0.0
4	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	2	0	0.0
7	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
8	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0
9	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0	1	0	0.0	2	0	0.0
10	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0	2	0	0.0	3	0	0.0
11	3	0	0.0	3	0	0.0	5	0	0.0	7	0	0.1	6	0	0.1	8	0	0.1
12	4	0	0.0	4	0	0.0	6	0	0.1	10	0	0.1	6	0	0.1	11	0	0.1
13	10	0	0.1	11	0	0.1	14	0	0.2	23	0	0.3	14	0	0.2	24	0	0.3
14	5	0	0.0	8	0	0.1	9	0	0.1	17	0	0.2	9	0	0.1	18	0	0.2
15	17	0	0.2	19	0	0.2	23	0	0.3	30	0	0.4	24	0	0.3	32	0	0.4
16	3	0	0.0	3	0	0.0	6	0	0.1	12	0	0.1	7	0	0.1	13	0	0.1
17	8	0	0.1	9	0	0.1	15	0	0.2	24	0	0.3	16	0	0.2	26	0	0.3
18	n	0	0.0	1	0	0.0	2	0	0.0	6	0	0.1	2	0	0.0	7	0	0.1
20	n	0	0.0	n	0	0.0	1	0	0.0	2	0	0.0	1	0	0.0	2	0	0.0
21	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0	1	0	0.0	1	0	0.0
22	1	0	0.0	1	0	0.0	2	0	0.0	2	0	0.0	2	0	0.0	3	0	0.0
23	2	0	0.0	2	0	0.0	3	0	0.0	3	0	0.0	3	0	0.0	4	0	0.0
24	2	0	0.0	2	0	0.0	3	0	0.0	3	0	0.0	4	0	0.0	5	0	0.0
26	1	0	0.0	1	0	0.0	2	0	0.0	2	0	0.0	2	0	0.0	2	0	0.0
27	1	0	0.0	1	0	0.0	2	0	0.0	2	0	0.0	3	0	0.0	3	0	0.0
28	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	2	0	0.0
29	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0	2	0	0.0
30	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	2	0	0.0
32	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0
33	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	2	0	0.0
34	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	2	0	0.0	3	0	0.0
35	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	2	0	0.0
37	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
38	n	0	0.0	n	0	0.0	2	0	0.0	3	0	0.0	2	0	0.0	4	0	0.0
39	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0	1	0	0.0	2	0	0.0
40	n	0	0.0	n	0	0.0	2	0	0.0	3	0	0.0	3	0	0.0	5	0	0.0
41	1	0	0.0	1	0	0.0	5	0	0.0	6	0	0.1	5	0	0.0	7	0	0.1
42	2	0	0.0	2	0	0.0	4	0	0.0	6	0	0.1	4	0	0.0	7	0	0.1
43	n	0	0.0	n	0	0.0	4	0	0.0	6	0	0.1	5	0	0.0	8	0	0.1
44	3	0	0.0	4	0	0.0	8	0	0.1	13	0	0.1	9	0	0.1	14	0	0.2
45	23	0	0.3	26	0	0.3	31	0	0.4	43	0	0.6	31	0	0.4	44	0	0.6
46	3	0	0.0	4	0	0.0	7	0	0.1	13	0	0.1	7	0	0.1	14	0	0.2
47	1	0	0.0	2	0	0.0	4	0	0.0	5	0	0.0	4	0	0.0	6	0	0.1

Table 15. -- Probabilities (expressed in percent chance) of one or more spills, the most likely number of spills, and the expected number of spills occurring and contacting land segments over the production life of the proposed lease area, deletion alternative IV.

Land Segment	------- Within 3 days ---------						------- Within 10 days --------						------- Within 30 days --------					
	Proposed			Existing and Proposed			Proposed			Existing and Proposed			Proposed			Existing and Proposed		
	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean
3	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
4	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
7	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
9	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
10	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0	2	0	0.0
11	n	0	0.0	n	0	0.0	1	0	0.0	2	0	0.0	1	0	0.0	3	0	0.0
12	n	0	0.0	n	0	0.0	1	0	0.0	6	0	0.1	1	0	0.0	6	0	0.1
13	1	0	0.0	3	0	0.0	4	0	0.0	14	0	0.2	4	0	0.0	14	0	0.2
14	1	0	0.0	4	0	0.0	3	0	0.0	12	0	0.1	3	0	0.0	12	0	0.1
15	1	0	0.0	3	0	0.0	3	0	0.0	12	0	0.1	4	0	0.0	13	0	0.1
16	1	0	0.0	1	0	0.0	2	0	0.0	7	0	0.1	2	0	0.0	8	0	0.1
17	2	0	0.0	4	0	0.0	6	0	0.1	17	0	0.2	7	0	0.1	18	0	0.2
18	n	0	0.0	1	0	0.0	2	0	0.0	6	0	0.1	2	0	0.0	7	0	0.1
20	n	0	0.0	n	0	0.0	1	0	0.0	2	0	0.0	1	0	0.0	2	0	0.0
22	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
23	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
24	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
28	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
29	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	n	0	0.0	1	0	0.0
30	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	2	0	0.0
33	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
34	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
35	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	2	0	0.0
38	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	n	0	0.0	2	0	0.0
39	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	n	0	0.0	2	0	0.0
40	n	0	0.0	n	0	0.0	n	0	0.0	2	0	0.0	1	0	0.0	2	0	0.0
41	n	0	0.0	n	0	0.0	1	0	0.0	2	0	0.0	1	0	0.0	3	0	0.0
42	n	0	0.0	n	0	0.0	n	0	0.0	2	0	0.0	1	0	0.0	3	0	0.0
43	n	0	0.0	n	0	0.0	1	0	0.0	3	0	0.0	1	0	0.0	5	0	0.0
44	n	0	0.0	1	0	0.0	2	0	0.0	7	0	0.1	2	0	0.0	8	0	0.1
45	3	0	0.0	6	0	0.1	8	0	0.1	24	0	0.3	8	0	0.1	24	0	0.3
46	n	0	0.0	2	0	0.0	2	0	0.0	8	0	0.1	2	0	0.0	9	0	0.1
47	n	0	0.0	n	0	0.0	1	0	0.0	2	0	0.0	1	0	0.0	3	0	0.0
48	n	0	0.0	1	0	0.0	1	0	0.0	5	0	0.0	2	0	0.0	6	0	0.1
49	1	0	0.0	3	0	0.0	2	0	0.0	8	0	0.1	3	0	0.0	11	0	0.1
50	2	0	0.0	5	0	0.0	3	0	0.0	8	0	0.1	3	0	0.0	8	0	0.1
51	1	0	0.0	2	0	0.0	1	0	0.0	3	0	0.0	1	0	0.0	3	0	0.0
53	6	0	0.1	18	0	0.2	10	0	0.1	29	0	0.3	10	0	0.1	29	0	0.3
54	7	0	0.1	24	0	0.3	11	0	0.1	40	0	0.5	11	0	0.1	41	0	0.5

Final

Table 17. -- Probabilities (expressed in percent chance) of one or more spills, the most likely number of spills, and the expected number of spills occurring and contacting land segments over the production life of the proposed lease area, transportation alternative A.

Land Segment	Within 3 days						Within 10 days						Within 30 days					
	Proposed			Existing and Proposed			Proposed			Existing and Proposed			Proposed			Existing and Proposed		
	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean
3	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0
4	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	2	0	0.0
7	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
8	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0
9	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	2	0	0.0
10	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0	2	0	0.0	3	0	0.0
11	1	0	0.0	1	0	0.0	3	0	0.0	4	0	0.0	3	0	0.0	6	0	0.1
12	2	0	0.0	3	0	0.0	5	0	0.1	10	0	0.1	6	0	0.1	10	0	0.1
13	5	0	0.0	6	0	0.1	9	0	0.1	19	0	0.2	10	0	0.1	20	0	0.2
14	3	0	0.0	6	0	0.1	7	0	0.1	15	0	0.2	8	0	0.1	16	0	0.2
15	4	0	0.0	6	0	0.1	11	0	0.1	19	0	0.2	12	0	0.1	21	0	0.2
16	3	0	0.0	3	0	0.0	7	0	0.1	12	0	0.1	7	0	0.1	13	0	0.1
17	9	0	0.1	10	0	0.1	17	0	0.2	26	0	0.3	18	0	0.2	28	0	0.3
18	n	0	0.0	1	0	0.0	3	0	0.0	7	0	0.1	4	0	0.0	8	0	0.1
20	n	0	0.0	1	0	0.0	1	0	0.0	2	0	0.0	1	0	0.0	2	0	0.0
21	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
22	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
23	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
24	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	2	0	0.0
27	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
28	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
29	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0	2	0	0.0
30	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	2	0	0.0
33	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	2	0	0.0
34	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0	2	0	0.0
35	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0	2	0	0.0
37	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
38	n	0	0.0	n	0	0.0	1	0	0.0	2	0	0.0	1	0	0.0	3	0	0.0
39	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0	2	0	0.0
40	n	0	0.0	n	0	0.0	1	0	0.0	2	0	0.0	1	0	0.0	3	0	0.0
41	n	0	0.0	n	0	0.0	2	0	0.0	4	0	0.0	2	0	0.0	4	0	0.0
42	n	0	0.0	n	0	0.0	2	0	0.0	4	0	0.0	3	0	0.0	5	0	0.0
43	n	0	0.0	n	0	0.0	3	0	0.0	5	0	0.0	3	0	0.0	7	0	0.1
44	n	0	0.0	1	0	0.0	5	0	0.0	10	0	0.1	5	0	0.1	11	0	0.1
45	19	0	0.2	22	0	0.3	29	0	0.3	41	0	0.5	29	0	0.3	42	0	0.5
46	2	0	0.0	4	0	0.0	6	0	0.1	12	0	0.1	6	0	0.1	13	0	0.1
47	1	0	0.0	1	0	0.0	3	0	0.0	4	0	0.0	3	0	0.0	5	0	0.1
48	3	0	0.0	4	0	0.0	7	0	0.1	10	0	0.1	8	0	0.1	12	0	0.1
49	3	0	0.0	5	0	0.1	8	0	0.1	13	0	0.1	9	0	0.1	17	0	0.2

Final

Table 16. -- Probabilities (expressed in percent chance) of one or more spills, the most likely number of spills, and the expected number of spills occurring and contacting land segments over the production life of the proposed lease area, deletion alternative V.

Land Segment	------- Within 3 days ---------						------- Within 10 days --------						------- Within 30 days --------					
	Proposed			Existing and Proposed			Proposed			Existing and Proposed			Proposed			Existing and Proposed		
	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean
3	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
4	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
7	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
9	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
10	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	2	0	0.0
11	n	0	0.0	n	0	0.0	n	0	0.0	2	0	0.0	1	0	0.0	3	0	0.0
12	n	0	0.0	n	0	0.0	1	0	0.0	5	0	0.1	1	0	0.0	6	0	0.1
13	1	0	0.0	2	0	0.0	3	0	0.0	13	0	0.1	3	0	0.0	14	0	0.2
14	1	0	0.0	4	0	0.0	2	0	0.0	11	0	0.1	2	0	0.0	11	0	0.1
15	n	0	0.0	3	0	0.0	2	0	0.0	11	0	0.1	2	0	0.0	12	0	0.1
16	n	0	0.0	1	0	0.0	1	0	0.0	7	0	0.1	1	0	0.0	7	0	0.1
17	1	0	0.0	2	0	0.0	4	0	0.0	15	0	0.2	4	0	0.0	16	0	0.2
18	n	0	0.0	1	0	0.0	1	0	0.0	5	0	0.0	1	0	0.0	6	0	0.1
20	n	0	0.0	n	0	0.0	n	0	0.0	2	0	0.0	n	0	0.0	2	0	0.0
22	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
23	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
24	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
28	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
29	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	n	0	0.0	1	0	0.0
30	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	2	0	0.0
33	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
34	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
35	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
38	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	n	0	0.0	2	0	0.0
39	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	n	0	0.0	2	0	0.0
40	n	0	0.0	n	0	0.0	n	0	0.0	2	0	0.0	n	0	0.0	2	0	0.0
41	n	0	0.0	n	0	0.0	1	0	0.0	2	0	0.0	1	0	0.0	3	0	0.0
42	n	0	0.0	n	0	0.0	n	0	0.0	2	0	0.0	n	0	0.0	3	0	0.0
43	n	0	0.0	n	0	0.0	1	0	0.0	3	0	0.0	1	0	0.0	4	0	0.0
44	n	0	0.0	1	0	0.0	2	0	0.0	7	0	0.1	2	0	0.0	8	0	0.1
45	1	0	0.0	4	0	0.0	5	0	0.0	21	0	0.2	5	0	0.0	22	0	0.2
46	n	0	0.0	2	0	0.0	1	0	0.0	8	0	0.1	2	0	0.0	9	0	0.1
47	n	0	0.0	n	0	0.0	n	0	0.0	2	0	0.0	n	0	0.0	3	0	0.0
48	n	0	0.0	1	0	0.0	1	0	0.0	4	0	0.0	1	0	0.0	5	0	0.0
49	1	0	0.0	3	0	0.0	2	0	0.0	8	0	0.1	2	0	0.0	10	0	0.1
50	2	0	0.0	5	0	0.0	2	0	0.0	7	0	0.1	2	0	0.0	8	0	0.1
51	1	0	0.0	1	0	0.0	1	0	0.0	2	0	0.0	1	0	0.0	2	0	0.0
53	6	0	0.1	17	0	0.2	8	0	0.1	28	0	0.3	8	0	0.1	28	0	0.3
54	6	0	0.1	24	0	0.3	10	0	0.1	39	0	0.5	10	0	0.1	39	0	0.5

Table 18. -- Probabilities (expressed in percent chance) of one or more spills, the most likely number of spills, and the expected number of spills occurring and contacting land segments over the production life of the proposed lease area, transportation alternative B.

Land Segment	------- Within 3 days --------- Proposed			Existing and Proposed			------- Within 10 days -------- Proposed			Existing and Proposed			------- Within 30 days -------- Proposed			Existing and Proposed		
	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean
3	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0
4	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	2	0	0.0
7	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0
8	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0
9	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	2	0	0.0
10	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0	1	0	0.0	3	0	0.0
11	1	0	0.0	1	0	0.0	2	0	0.0	4	0	0.0	3	0	0.0	6	0	0.1
12	3	0	0.0	3	0	0.0	6	0	0.1	10	0	0.1	6	0	0.1	11	0	0.1
13	5	0	0.0	6	0	0.1	10	0	0.1	19	0	0.2	11	0	0.1	20	0	0.2
14	3	0	0.0	6	0	0.1	8	0	0.1	16	0	0.2	8	0	0.1	17	0	0.2
15	4	0	0.0	6	0	0.1	11	0	0.1	20	0	0.2	12	0	0.1	21	0	0.2
16	3	0	0.0	4	0	0.0	6	0	0.1	12	0	0.1	7	0	0.1	12	0	0.1
17	9	0	0.1	11	0	0.1	17	0	0.2	27	0	0.3	18	0	0.2	29	0	0.3
18	1	0	0.0	1	0	0.0	3	0	0.0	7	0	0.1	4	0	0.0	8	0	0.1
20	n	0	0.0	1	0	0.0	1	0	0.0	2	0	0.0	1	0	0.0	2	0	0.0
21	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
22	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
23	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0
24	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	2	0	0.0
27	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
28	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0
29	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0	1	0	0.0	2	0	0.0
30	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	2	0	0.0
33	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	2	0	0.0
34	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0	2	0	0.0
35	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0	2	0	0.0
37	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0
38	n	0	0.0	n	0	0.0	1	0	0.0	2	0	0.0	2	0	0.0	3	0	0.0
39	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0	2	0	0.0
40	n	0	0.0	n	0	0.0	1	0	0.0	3	0	0.0	2	0	0.0	4	0	0.0
41	n	0	0.0	n	0	0.0	2	0	0.0	4	0	0.0	3	0	0.0	4	0	0.0
42	n	0	0.0	n	0	0.0	2	0	0.0	4	0	0.0	2	0	0.0	5	0	0.0
43	n	0	0.0	n	0	0.0	3	0	0.0	5	0	0.0	3	0	0.0	7	0	0.1
44	n	0	0.0	1	0	0.0	5	0	0.0	10	0	0.1	5	0	0.0	11	0	0.1
45	19	0	0.2	22	0	0.3	29	0	0.3	41	0	0.5	29	0	0.3	42	0	0.5
46	2	0	0.0	4	0	0.0	7	0	0.1	13	0	0.1	7	0	0.1	14	0	0.2
47	1	0	0.0	1	0	0.0	3	0	0.0	4	0	0.0	3	0	0.0	5	0	0.1
48	3	0	0.0	4	0	0.0	7	0	0.1	10	0	0.1	7	0	0.1	11	0	0.1
49	3	0	0.0	6	0	0.1	8	0	0.1	14	0	0.2	9	0	0.1	17	0	0.2

Final

Table 19. -- Probabilities (expressed in percent chance) of one or more spills, the most likely number of spills, and the expected number of spills occurring and contacting land segments over the production life of the proposed lease area, transportation alternative C.

Land Segment	------- Within 3 days ---------						------- Within 10 days --------						------- Within 30 days --------					
	Proposed			Existing and Proposed			Proposed			Existing and Proposed			Proposed			Existing and Proposed		
	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean
1	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0
3	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	2	0	0.0
4	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	2	0	0.0
7	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
8	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
9	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0	1	0	0.0	2	0	0.0
10	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0	2	0	0.0	3	0	0.0
11	1	0	0.0	1	0	0.0	3	0	0.0	4	0	0.0	3	0	0.0	5	0	0.1
12	3	0	0.0	3	0	0.0	6	0	0.1	10	0	0.1	6	0	0.1	11	0	0.1
13	8	0	0.1	10	0	0.1	12	0	0.1	21	0	0.2	13	0	0.1	22	0	0.3
14	4	0	0.0	7	0	0.1	8	0	0.1	16	0	0.2	8	0	0.1	17	0	0.2
15	7	0	0.1	9	0	0.1	13	0	0.1	21	0	0.2	14	0	0.2	23	0	0.3
16	5	0	0.1	6	0	0.1	10	0	0.1	15	0	0.2	10	0	0.1	16	0	0.2
17	36	0	0.4	37	0	0.5	41	0	0.5	48	0	0.6	42	0	0.5	50	0	0.7
18	1	0	0.0	2	0	0.0	2	0	0.0	6	0	0.1	3	0	0.0	7	0	0.1
20	1	0	0.0	1	0	0.0	2	0	0.0	3	0	0.0	2	0	0.0	3	0	0.0
21	2	0	0.0	2	0	0.0	3	0	0.0	3	0	0.0	4	0	0.0	4	0	0.0
22	1	0	0.0	1	0	0.0	2	0	0.0	2	0	0.0	4	0	0.0	4	0	0.0
23	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
24	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	2	0	0.0
26	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0
27	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0	1	0	0.0	2	0	0.0
28	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0
29	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	2	0	0.0	3	0	0.0
30	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	2	0	0.0
32	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	2	0	0.0	2	0	0.0
33	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	2	0	0.0
34	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	2	0	0.0
35	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0	2	0	0.0
37	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
38	n	0	0.0	n	0	0.0	1	0	0.0	3	0	0.0	2	0	0.0	4	0	0.0
39	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0	1	0	0.0	2	0	0.0
40	n	0	0.0	n	0	0.0	1	0	0.0	3	0	0.0	2	0	0.0	4	0	0.0
41	n	0	0.0	n	0	0.0	3	0	0.0	5	0	0.0	4	0	0.0	5	0	0.0
42	n	0	0.0	n	0	0.0	4	0	0.0	6	0	0.1	4	0	0.0	7	0	0.1
43	n	0	0.0	n	0	0.0	3	0	0.0	6	0	0.1	4	0	0.0	7	0	0.1
44	2	0	0.0	3	0	0.0	7	0	0.1	12	0	0.1	7	0	0.1	13	0	0.1
45	28	0	0.3	30	0	0.4	35	0	0.4	46	0	0.6	35	0	0.4	47	0	0.6
46	3	0	0.0	4	0	0.0	7	0	0.1	13	0	0.1	7	0	0.1	14	0	0.2

Final

Table 21 -- Probabilities (expressed in percent chance) of one or more spills, the most likely number of spills, and the expected number of spills occurring and contacting land segments over the production life of the proposed lease area, compared with total risks from the proposed leases, existing leases, and existing tanker transportation.(including upper Cook Inlet).

	------- Within 3 days			---------			------- Within 10 days			--------			------- Within 30 days			--------		
	Proposed			Existing, Proposed + tanker			Proposed			Existing, Proposed + tanker			Proposed			Existing, Proposed + tanker		
Land Segment	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean
3	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	2	0	0.0
4	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	3	0	0.0
7	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
8	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0
9	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0	1	0	0.0	3	0	0.0
10	n	0	0.0	n	0	0.0	1	0	0.0	2	0	0.0	2	0	0.0	3	0	0.0
11	3	0	0.0	3	0	0.0	5	0	0.0	8	0	0.1	6	0	0.1	10	0	0.1
12	4	0	0.0	4	0	0.0	6	0	0.1	12	0	0.1	6	0	0.1	13	0	0.1
13	10	0	0.1	11	0	0.1	14	0	0.2	27	0	0.3	14	0	0.2	28	0	0.3
14	5	0	0.0	8	0	0.1	9	0	0.1	21	0	0.2	9	0	0.1	22	0	0.2
15	17	0	0.2	19	0	0.2	23	0	0.3	33	0	0.4	24	0	0.3	35	0	0.4
16	3	0	0.0	4	0	0.0	6	0	0.1	14	0	0.2	7	0	0.1	15	0	0.2
17	8	0	0.1	9	0	0.1	15	0	0.2	29	0	0.3	16	0	0.2	31	0	0.4
18	n	0	0.0	1	0	0.0	2	0	0.0	8	0	0.1	2	0	0.0	10	0	0.1
20	n	0	0.0	1	0	0.0	1	0	0.0	3	0	0.0	1	0	0.0	3	0	0.0
21	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0	1	0	0.0	1	0	0.0
22	1	0	0.0	1	0	0.0	2	0	0.0	2	0	0.0	2	0	0.0	3	0	0.0
23	2	0	0.0	2	0	0.0	3	0	0.0	3	0	0.0	3	0	0.0	5	0	0.0
24	2	0	0.0	2	0	0.0	3	0	0.0	3	0	0.0	4	0	0.0	6	0	0.1
26	1	0	0.0	1	0	0.0	2	0	0.0	2	0	0.0	2	0	0.0	2	0	0.0
27	1	0	0.0	1	0	0.0	2	0	0.0	2	0	0.0	3	0	0.0	3	0	0.0
28	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	2	0	0.0
29	n	0	0.0	n	0	0.0	n	0	0.0	2	0	0.0	1	0	0.0	3	0	0.0
30	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	4	0	0.0
32	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0
33	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	3	0	0.0
34	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	2	0	0.0	4	0	0.0
35	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0	3	0	0.0
37	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
38	n	0	0.0	n	0	0.0	2	0	0.0	3	0	0.0	2	0	0.0	4	0	0.0
39	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0	1	0	0.0	3	0	0.0
40	n	0	0.0	n	0	0.0	2	0	0.0	4	0	0.0	3	0	0.0	6	0	0.1
41	1	0	0.0	1	0	0.0	5	0	0.0	7	0	0.1	5	0	0.0	8	0	0.1
42	2	0	0.0	2	0	0.0	4	0	0.0	7	0	0.1	4	0	0.0	8	0	0.1
43	n	0	0.0	n	0	0.0	4	0	0.0	7	0	0.1	5	0	0.0	9	0	0.1
44	3	0	0.0	4	0	0.0	8	0	0.1	15	0	0.2	9	0	0.1	16	0	0.2
45	23	0	0.3	26	0	0.3	31	0	0.4	47	0	0.6	31	0	0.4	48	0	0.6

46	3	0	0.0	4	0	0.0	7	0	0.1	15	0	0.2	7	0	0.1	17	0	0.2
47	1	0	0.0	2	0	0.0	4	0	0.0	6	0	0.1	4	0	0.0	7	0	0.1
48	6	0	0.1	7	0	0.1	11	0	0.1	15	0	0.2	11	0	0.1	17	0	0.2
49	3	0	0.0	5	0	0.1	7	0	0.1	14	0	0.2	8	0	0.1	19	0	0.2
50	2	0	0.0	5	0	0.0	3	0	0.0	10	0	0.1	3	0	0.0	11	0	0.1
51	1	0	0.0	2	0	0.0	1	0	0.0	3	0	0.0	1	0	0.0	3	0	0.0
53	6	0	0.1	19	0	0.2	10	0	0.1	34	0	0.4	10	0	0.1	34	0	0.4
54	6	0	0.1	28	0	0.3	12	0	0.1	55	0	0.8	12	0	0.1	56	0	0.8
55	n	0	0.0	1	0	0.0	1	0	0.0	4	0	0.0	1	0	0.0	4	0	0.0
56	6	0	0.1	28	0	0.3	9	0	0.1	49	0	0.7	10	0	0.1	51	0	0.7
57	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0	4	0	0.0
58	2	0	0.0	5	0	0.0	3	0	0.0	16	0	0.2	4	0	0.0	19	0	0.2
59	1	0	0.0	7	0	0.1	2	0	0.0	17	0	0.2	3	0	0.0	19	0	0.2
60	2	0	0.0	9	0	0.1	4	0	0.0	21	0	0.2	4	0	0.0	23	0	0.3
61	1	0	0.0	2	0	0.0	1	0	0.0	8	0	0.1	1	0	0.0	9	0	0.1
62	1	0	0.0	1	0	0.0	2	0	0.0	10	0	0.1	2	0	0.0	10	0	0.1
63	1	0	0.0	1	0	0.0	1	0	0.0	8	0	0.1	1	0	0.0	9	0	0.1
64	n	0	0.0	11	0	0.1	2	0	0.0	30	0	0.4	3	0	0.0	32	0	0.4
65	n	0	0.0	n	0	0.0	n	0	0.0	2	0	0.0	n	0	0.0	2	0	0.0
66	n	0	0.0	n	0	0.0	1	0	0.0	5	0	0.0	1	0	0.0	6	0	0.1
67	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	n	0	0.0	1	0	0.0
69	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	n	0	0.0	1	0	0.0
70	n	0	0.0	4	0	0.0	1	0	0.0	10	0	0.1	1	0	0.0	10	0	0.1
72	n	0	0.0	1	0	0.0	n	0	0.0	2	0	0.0	n	0	0.0	3	0	0.0
73	n	0	0.0	1	0	0.0	n	0	0.0	2	0	0.0	1	0	0.0	3	0	0.0
74	n	0	0.0	3	0	0.0	1	0	0.0	5	0	0.0	1	0	0.0	6	0	0.1
75	7	0	0.1	40	0	0.5	8	0	0.1	45	0	0.6	8	0	0.1	46	0	0.6
76	n	0	0.0	1	0	0.0	n	0	0.0	2	0	0.0	n	0	0.0	3	0	0.0
77	n	0	0.0	n	0	0.0	n	0	0.0	2	0	0.0	n	0	0.0	2	0	0.0
78	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0	4	0	0.0
79	1	0	0.0	8	0	0.1	3	0	0.0	22	0	0.3	3	0	0.0	26	0	0.3
80	1	0	0.0	9	0	0.1	3	0	0.0	20	0	0.2	5	0	0.0	25	0	0.3
81	3	0	0.0	11	0	0.1	6	0	0.1	28	0	0.3	8	0	0.1	34	0	0.4
82	1	0	0.0	8	0	0.1	2	0	0.0	14	0	0.2	3	0	0.0	17	0	0.2
83	n	0	0.0	2	0	0.0	2	0	0.0	14	0	0.2	4	0	0.0	19	0	0.2
84	n	0	0.0	2	0	0.0	1	0	0.0	9	0	0.1	3	0	0.0	14	0	0.2
85	n	0	0.0	1	0	0.0	1	0	0.0	7	0	0.1	2	0	0.0	10	0	0.1
86	n	0	0.0	n	0	0.0	n	0	0.0	3	0	0.0	1	0	0.0	9	0	0.1
87	n	0	0.0	n	0	0.0	n	0	0.0	2	0	0.0	1	0	0.0	3	0	0.0
88	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	2	0	0.0
89	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	3	0	0.0
90	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
91	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	3	0	0.0
92	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	2	0	0.0
93	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	2	0	0.0
94	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	2	0	0.0

Note: n = less than 0.5 percent. Those land segments for which all probabilities are less than 0.5 percent are not shown.

Table 20 -- Probabilities (expressed in percent chance) of one or more spills, the most likely number of spills, and the expected number of spills occurring and contacting targets over the production life of the proposed lease area, existing leases, and existing tanker transportation (including upper Cook Inlet).

	Within 3 days						Within 10 days						Within 30 days					
	Proposed			Existing, Proposed + tanker			Proposed			Existing, Proposed + tanker			Proposed			Existing, Proposed + tanker		
Target	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean
Land	77	1	1.5	97	3	3.6	94	2	2.8	**	9	9.2	96	3	3.3	**	10	10.9
Seabird, S., Apr-Sep	49	0	0.7	54	0	0.8	54	0	0.8	69	1	1.2	55	0	0.8	70	1	1.2
Seabird, S., Oct-Mar	57	0	0.8	70	1	1.2	63	0	1.0	88	2	2.2	63	1	1.0	89	2	2.2
Seabird, N., Apr-Sep	35	0	0.4	93	2	2.7	38	0	0.5	95	2	2.9	40	0	0.5	95	2	3.0
Seabird, N., Oct-Mar	33	0	0.4	93	2	2.7	36	0	0.4	95	3	3.0	37	0	0.5	95	3	3.1
Sea otter, area A	3	0	0.0	22	0	0.3	5	0	0.1	38	0	0.5	8	0	0.1	46	0	0.6
Sea otter, area B	1	0	0.0	11	0	0.1	8	0	0.1	41	0	0.5	13	0	0.1	55	0	0.8
Sea otter, area C	5	0	0.1	28	0	0.3	11	0	0.1	50	0	0.7	14	0	0.2	56	0	0.8
Sea otter, area D	35	0	0.4	43	0	0.6	48	0	0.7	74	1	1.3	50	0	0.7	77	1	1.5
Sea otter, area E	8	0	0.1	13	0	0.1	17	0	0.2	31	0	0.4	17	0	0.2	35	0	0.4
Sea otter, area F	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	4	0	0.0	6	0	0.1
Sea otter, area G	12	0	0.1	58	0	0.9	13	0	0.1	64	1	1.0	13	0	0.1	65	1	1.1
Sea otter, area H	22	0	0.2	65	1	1.0	33	0	0.4	89	2	2.2	35	0	0.4	90	2	2.3
Red River salmon	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
Karluk River salmon	3	0	0.0	3	0	0.0	6	0	0.1	9	0	0.1	6	0	0.1	10	0	0.1
Rocky, All., Grassy	6	0	0.1	7	0	0.1	10	0	0.1	20	0	0.2	10	0	0.1	22	0	0.2
Dark, Sent., Latax	3	0	0.0	5	0	0.0	6	0	0.1	17	0	0.2	7	0	0.1	20	0	0.2
Barren Islands	7	0	0.1	36	0	0.4	14	0	0.1	58	0	0.9	17	0	0.2	64	1	1.0
Augustine Island	11	0	0.1	50	0	0.7	16	0	0.2	71	1	1.2	17	0	0.2	72	1	1.3
Kiukpalik, Shakun	11	0	0.1	14	0	0.1	19	0	0.2	28	0	0.3	19	0	0.2	31	0	0.4

Note: n = less than 0.5 percent; ** = greater than 99.5 percent.

Table 22 -- Final probabilities (expressed in percent chance) of one or more spills, the most likely number of spills, and the expected number of spills occurring and contacting targets over the production life of the existing leases.

	5 DAYS			10 DAYS			30 DAYS		
	PROB	MODE	MEAN	PROB	MODE	MEAN	PROB	MODE	MEAN
	76	1	1.4	97	3	3.6	98	4	4.2
EABIRD FORAGING AREA SOUTH APRIL-SEPTEMBER	10	0	0.1	25	0	0.3	26	0	0.3
EABIRD FORAGING AREA SOUTH OCTOBER-MARCH	29	0	0.3	54	0	0.8	54	0	0.8
EABIRD FORAGING AREA NORTH APRIL-SEPTEMBER	75	1	1.4	77	1	1.5	77	1	1.5
EABIRD FORAGING AREA NORTH OCTOBER-MARCH	75	1	1.4	76	1	1.4	77	1	1.5
EA OTTER CONCENTRATION AREA A	9	0	0.1	15	0	0.2	19	0	0.2
EA OTTER CONCENTRATION AREA B	0	0	0.0	19	0	0.2	28	0	0.3
EA OTTER CONCENTRATION AREA C	18	0	0.2	32	0	0.4	35	0	0.4
EA OTTER CONCENTRATION AREA D	12	0	0.1	37	0	0.5	39	0	0.5
EA OTTER CONCENTRATION AREA E	5	0	0.0	13	0	0.1	14	0	0.2
EA OTTER CONCENTRATION AREA F	0	0	0.0	0	0	0.0	1	0	0.0
EA OTTER CONCENTRATION AREA G	29	0	0.3	31	0	0.4	32	0	0.4
EA OTTER CONCENTRATION AREA H	49	0	0.7	60	1	1.1	67	1	1.1
ED RIVER SALMON SCHOOLING AREA	0	0	0.0	0	0	0.0	0	0	0.0
ARLUK RIVER SALMON SCHOOLING AREA	0	0	0.0	2	0	0.0	3	0	0.0
OCKY, ALLIGATOR, AND GRASSY ISLANDS AREA	2	0	0.0	9	0	0.1	9	0	0.1
ARK, SENTINEL ISLANDS, AND LATAX ROCKS AREA	2	0	0.0	9	0	0.1	10	0	0.1
ARREN ISLANDS AREA	24	0	0.3	38	0	0.5	40	0	0.5
UGUSTINE ISLAND AREA	33	0	0.4	44	0	0.6	45	0	0.6
IUKPALIK, SHAKUN ISLANDS, AND SHAKUN ROCK AREA	3	0	0.0	9	0	0.1	10	0	0.1

Table 23 -- Final probabilities (expressed in percent chance) of one or more spills, the most likely number of spills, and the expected number of spills occurring and contacting targets over the production life of the existing tanker transportation (including upper Cook Inlet).

							30 DAYS		
	PROB	MODE	MEAN	PROB	MODE	MEAN	PROB	MODE	MEAN
AND	50	0	0.7	94	2	2.8	97	3	3.5
SEABIRD FORAGING AREA SOUTH APRIL-SEPTEMBER	0	0	0.0	8	0	0.1	10	0	0.1
SEABIRD FORAGING AREA SOUTH OCTOBER-MARCH	1	0	0.0	32	0	0.4	34	0	0.4
SEABIRD FORAGING AREA NORTH APRIL-SEPTEMBER	57	0	0.8	65	0	1.0	64	1	1.0
SEABIRD FORAGING AREA NORTH OCTOBER-MARCH	61	0	0.9	68	1	1.1	69	1	1.2
SEA OTTER CONCENTRATION AREA A	12	0	0.1	23	0	0.3	27	0	0.3
SEA OTTER CONCENTRATION AREA B	5	0	0.1	21	0	0.2	28	0	0.3
SEA OTTER CONCENTRATION AREA C	7	0	0.1	18	0	0.2	22	0	0.2
SEA OTTER CONCENTRATION AREA D	1	0	0.0	20	0	0.2	23	0	0.3
SEA OTTER CONCENTRATION AREA E	1	0	0.0	6	0	0.1	8	0	0.1
SEA OTTER CONCENTRATION AREA F	0	0	0.0	0	0	0.0	1	0	0.0
SEA OTTER CONCENTRATION AREA G	34	0	0.4	39	0	0.5	41	0	0.5
SEA OTTER CONCENTRATION AREA H	13	0	0.1	50	0	0.7	52	0	0.7
RED RIVER SALMON SCHOOLING AREA	0	0	0.0	0	0	0.0	0	0	0.0
ARLUK RIVER SALMON SCHOOLING AREA	0	0	0.0	1	0	0.0	2	0	0.0
OCKY, ALLIGATOR, AND GRASSY ISLANDS AREA	0	0	0.0	4	0	0.0	4	0	0.0
ARK, SENTINEL ISLANDS, AND LATAX ROCKS AREA	1	0	0.0	4	0	0.0	5	0	0.0
ARREN ISLANDS AREA	10	0	0.1	23	0	0.3	28	0	0.3
UGUSTINE ISLAND AREA	15	0	0.2	38	0	0.5	39	0	0.5
IUKPALIK, SHAKUN ISLANDS, AND SHAKUN ROCK AREA	0	0	0.0	5	0	0.0	5	0	0.1

Table 24 -- Final probabilities (expressed in percent chance) of one or more spills, the most likely number of spills, and the expected number of spills occurring and contacting land segments over the production life of the existing leases and existing tankering (including upper Cook Inlet).

SEGMENT	3 DAYS			10 DAYS			30 DAYS		
	PROB	MODE	MEAN	PROB	MODE	MEAN	PROB	MODE	MEAN
1	0	0	0.0	0	0	0.0	0	0	0.0
2	0	0	0.0	0	0	0.0	0	0	0.0
3	0	0	0.0	0	0	0.0	1	0	0.01
4	0	0	0.0	0	0	0.0	1	0	0.01
5	0	0	0.0	0	0	0.0	0	0	0.0
6	0	0	0.0	0	0	0.0	0	0	0.00
7	0	0	0.0	0	0	0.0	0	0	0.00
8	0	0	0.0	0	0	0.0	0	0	0.00
9	0	0	0.0	0	0	0.0	1	0	0.01
10	0	0	0.0	0	0	0.00	1	0	0.01
11	0	0	0.0	2	0	0.02	3	0	0.03
12	0	0	0.00	4	0	0.04	5	0	0.05
13	2	0	0.02	10	0	0.11	11	0	0.12
14	3	0	0.03	9	0	0.09	9	0	0.10
15	2	0	0.02	9	0	0.10	10	0	0.11
16	1	0	0.01	6	0	0.06	6	0	0.07
17	2	0	0.02	12	0	0.12	13	0	0.14
18	1	0	0.01	4	0	0.04	5	0	0.05
19	0	0	0.0	0	0	0.00	0	0	0.00
20	0	0	0.00	1	0	0.01	1	0	0.01
21	0	0	0.0	0	0	0.0	0	0	0.00
22	0	0	0.0	0	0	0.00	1	0	0.01
23	0	0	0.0	0	0	0.0	1	0	0.01
24	0	0	0.0	0	0	0.0	1	0	0.01
25	0	0	0.0	0	0	0.0	0	0	0.0
26	0	0	0.0	0	0	0.0	0	0	0.00
27	0	0	0.0	0	0	0.0	0	0	0.00
28	0	0	0.0	0	0	0.0	1	0	0.01
29	0	0	0.0	1	0	0.01	1	0	0.01
30	0	0	0.0	0	0	0.0	1	0	0.01
31	0	0	0.0	0	0	0.0	0	0	0.0
32	0	0	0.0	0	0	0.0	0	0	0.0
33	0	0	0.0	0	0	0.0	1	0	0.01
34	0	0	0.0	0	0	0.00	1	0	0.01
35	0	0	0.0	0	0	0.00	1	0	0.01
36	0	0	0.0	0	0	0.0	0	0	0.00
37	0	0	0.0	0	0	0.0	0	0	0.00
38	0	0	0.0	1	0	0.01	2	0	0.02
39	0	0	0.0	0	0	0.00	1	0	0.01
40	0	0	0.0	1	0	0.01	2	0	0.02
41	0	0	0.0	1	0	0.01	2	0	0.02
42	0	0	0.0	2	0	0.02	2	0	0.02
43	0	0	0.0	3	0	0.03	4	0	0.04
44	0	0	0.00	5	0	0.05	6	0	0.06
45	4	0	0.04	17	0	0.19	18	0	0.19
46	2	0	0.02	6	0	0.07	7	0	0.07
47	0	0	0.00	1	0	0.01	2	0	0.02
48	1	0	0.01	3	0	0.03	4	0	0.04
49	2	0	0.02	6	0	0.06	8	0	0.09
50	3	0	0.03	5	0	0.05	5	0	0.06
51	1	0	0.01	2	0	0.02	2	0	0.02
52	0	0	0.0	0	0	0.00	0	0	0.00
53	13	0	0.13	21	0	0.24	21	0	0.24
54	19	0	0.21	32	0	0.39	33	0	0.40
55	0	0	0.00	2	0	0.02	2	0	0.02
56	19	0	0.22	27	0	0.32	28	0	0.33
57	0	0	0.00	1	0	0.01	1	0	0.01
58	3	0	0.03	8	0	0.09	9	0	0.10
59	6	0	0.06	11	0	0.12	11	0	0.12
60	7	0	0.07	12	0	0.12	12	0	0.13
61	1	0	0.01	3	0	0.03	3	0	0.03
62	0	0	0.00	4	0	0.04	4	0	0.04
63	0	0	0.00	3	0	0.03	3	0	0.03
64	0	0	0.00	6	0	0.06	7	0	0.07

65	0	0	0.0	1	0	0.01	1	0	0.01
66	0	0	0.0	1	0	0.01	2	0	0.02
67	0	0	0.0	0	0	0.00	0	0	0.00
68	0	0	0.0	0	0	0.0	0	0	0.0
69	0	0	0.0	0	0	0.00	0	0	0.00
70	0	0	0.00	2	0	0.02	2	0	0.02
71	0	0	0.0	0	0	0.00	0	0	0.00
72	1	0	0.01	1	0	0.01	1	0	0.01
73	0	0	0.00	1	0	0.01	1	0	0.01
74	1	0	0.01	2	0	0.02	2	0	0.02
75	18	0	0.19	20	0	0.22	20	0	0.23
76	0	0	0.00	1	0	0.01	1	0	0.01
77	0	0	0.00	0	0	0.00	1	0	0.01
78	0	0	0.00	1	0	0.01	2	0	0.02
79	3	0	0.03	7	0	0.08	9	0	0.10
80	4	0	0.04	8	0	0.09	11	0	0.12
81	7	0	0.08	17	0	0.18	19	0	0.21
82	5	0	0.05	9	0	0.09	10	0	0.10
83	1	0	0.01	6	0	0.07	8	0	0.08
84	1	0	0.01	4	0	0.04	6	0	0.07
85	0	0	0.00	2	0	0.02	4	0	0.04
86	0	0	0.0	1	0	0.01	4	0	0.04
87	0	0	0.0	1	0	0.01	1	0	0.01
88	0	0	0.0	0	0	0.00	1	0	0.01
89	0	0	0.0	0	0	0.0	1	0	0.01
90	0	0	0.0	0	0	0.0	0	0	0.00
91	0	0	0.0	0	0	0.0	1	0	0.01
92	0	0	0.0	0	0	0.0	1	0	0.01
93	0	0	0.0	0	0	0.0	1	0	0.01
94	0	0	0.0	0	0	0.0	1	0	0.01
95	0	0	0.0	0	0	0.0	0	0	0.0
96	0	0	0.0	0	0	0.0	0	0	0.0

Table 25 -- Final probabilities (expressed in percent chance) of one or more spills, the most likely number of spills, and the expected number of spills occurring and contacting targets over the production life of the existing tankering in upper Cook Inlet.

SEGMENT	3 DAYS			10 DAYS			30 DAYS		
	PROB	MODE	MEAN	PROB	MODE	MEAN	PROB	MODE	MEAN
1	0	0	0.0	0	0	0.0	0	0	0.0
2	0	0	0.0	0	0	0.0	0	0	0.0
3	0	0	0.0	0	0	0.0	0	0	0.00
4	0	0	0.0	0	0	0.0	1	0	0.01
5	0	0	0.0	0	0	0.0	0	0	0.0
6	0	0	0.0	0	0	0.0	0	0	0.0
7	0	0	0.0	0	0	0.0	0	0	0.00
8	0	0	0.0	0	0	0.0	0	0	0.00
9	0	0	0.0	0	0	0.0	0	0	0.00
10	0	0	0.0	0	0	0.00	0	0	0.00
11	0	0	0.0	1	0	0.01	2	0	0.02
12	0	0	0.0	2	0	0.02	3	0	0.03
13	0	0	0.0	5	0	0.05	6	0	0.06
14	0	0	0.0	4	0	0.04	5	0	0.05
15	0	0	0.0	4	0	0.05	5	0	0.05
16	0	0	0.00	2	0	0.02	3	0	0.03
17	0	0	0.00	5	0	0.06	7	0	0.07
18	0	0	0.00	2	0	0.02	3	0	0.03
19	0	0	0.0	0	0	0.0	0	0	0.0
20	0	0	0.00	1	0	0.01	1	0	0.01
21	0	0	0.0	0	0	0.0	0	0	0.00
22	0	0	0.0	0	0	0.0	1	0	0.01
23	0	0	0.0	0	0	0.0	1	0	0.01
24	0	0	0.0	0	0	0.0	1	0	0.01
25	0	0	0.0	0	0	0.0	0	0	0.0
26	0	0	0.0	0	0	0.0	0	0	0.0
27	0	0	0.0	0	0	0.0	0	0	0.00
28	0	0	0.0	0	0	0.0	1	0	0.01
29	0	0	0.0	1	0	0.01	1	0	0.01
30	0	0	0.0	0	0	0.0	2	0	0.02
31	0	0	0.0	0	0	0.0	0	0	0.0
32	0	0	0.0	0	0	0.0	0	0	0.0

33	0	0	0.0	0	0	0.0	1	0	0.01
34	0	0	0.0	0	0	0.00	1	0	0.01
35	0	0	0.0	0	0	0.00	1	0	0.01
36	0	0	0.0	0	0	0.0	0	0	0.00
37	0	0	0.0	0	0	0.0	0	0	0.0
38	0	0	0.0	0	0	0.00	0	0	0.00
39	0	0	0.0	0	0	0.00	0	0	0.00
40	0	0	0.0	1	0	0.01	1	0	0.01
41	0	0	0.0	1	0	0.01	1	0	0.01
42	0	0	0.0	1	0	0.01	1	0	0.01
43	0	0	0.0	0	0	0.00	1	0	0.01
44	0	0	0.0	2	0	0.02	3	0	0.03
45	0	0	0.0	7	0	0.07	8	0	0.08
46	0	0	0.00	2	0	0.02	4	0	0.04
47	0	0	0.0	1	0	0.01	1	0	0.01
48	0	0	0.0	1	0	0.01	3	0	0.03
49	0	0	0.00	2	0	0.02	4	0	0.04
50	0	0	0.00	2	0	0.02	3	0	0.03
51	0	0	0.00	1	0	0.01	1	0	0.01
52	0	0	0.0	0	0	0.0	0	0	0.0
53	2	0	0.02	7	0	0.07	7	0	0.08
54	5	0	0.05	24	0	0.28	26	0	0.30
55	0	0	0.0	2	0	0.02	2	0	0.02
56	4	0	0.04	23	0	0.26	24	0	0.27
57	0	0	0.0	0	0	0.00	2	0	0.02
58	0	0	0.00	5	0	0.05	7	0	0.07
59	0	0	0.0	5	0	0.05	6	0	0.06
60	1	0	0.01	7	0	0.08	8	0	0.09
61	0	0	0.00	4	0	0.04	5	0	0.05
62	0	0	0.0	4	0	0.04	5	0	0.05
63	0	0	0.0	4	0	0.04	5	0	0.05
64	10	0	0.11	24	0	0.28	25	0	0.28
65	0	0	0.0	1	0	0.01	1	0	0.01
66	0	0	0.0	3	0	0.03	3	0	0.03
67	0	0	0.0	1	0	0.01	1	0	0.01
68	0	0	0.0	0	0	0.00	0	0	0.00
69	0	0	0.0	0	0	0.00	0	0	0.00
70	3	0	0.03	8	0	0.08	8	0	0.08
71	0	0	0.0	0	0	0.0	0	0	0.0
72	1	0	0.01	1	0	0.01	1	0	0.01
73	1	0	0.01	1	0	0.01	2	0	0.02
74	1	0	0.01	3	0	0.03	3	0	0.04
75	21	0	0.24	25	0	0.29	26	0	0.30
76	0	0	0.00	1	0	0.01	2	0	0.02
77	0	0	0.00	1	0	0.01	1	0	0.01
78	0	0	0.00	0	0	0.00	2	0	0.02
79	5	0	0.05	14	0	0.15	15	0	0.17
80	4	0	0.04	10	0	0.10	11	0	0.12
81	1	0	0.01	9	0	0.09	11	0	0.12
82	2	0	0.02	4	0	0.04	6	0	0.06
83	1	0	0.01	6	0	0.07	8	0	0.08
84	1	0	0.01	4	0	0.04	6	0	0.06
85	0	0	0.00	3	0	0.03	5	0	0.05
86	0	0	0.0	1	0	0.01	5	0	0.05
87	0	0	0.0	1	0	0.01	1	0	0.01
88	0	0	0.0	0	0	0.00	1	0	0.01
89	0	0	0.0	0	0	0.0	1	0	0.01
90	0	0	0.0	0	0	0.0	0	0	0.00
91	0	0	0.0	0	0	0.0	2	0	0.02
92	0	0	0.0	0	0	0.0	1	0	0.01
93	0	0	0.0	0	0	0.0	1	0	0.01
94	0	0	0.0	0	0	0.0	1	0	0.01
95	0	0	0.0	0	0	0.0	0	0	0.0
96	0	0	0.0	0	0	0.0	0	0	0.0

Table 28 -- Final Probabilities (expressed in percent chance) of one or more spills, the most likely number of spills, and the expected number of spills occurring and contacting land segments over the production life of Alternative VI, existing leases and tanker transportation (including upper Cook Inlet).

				10 DAYS			30 DAYS		
	PROB	MODE	MEAN	PROB	MODE	MEAN	PROB	MODE	MEAN
LAND	95	2	3.0	100	7	7.8	100	9	9.3
SEABIRD FORAGING AREA SOUTH APRIL-SEPTEMBER	49	0	0.7	63	0	1.0	64	1	1.0
SEABIRD FORAGING AREA SOUTH OCTOBER-MARCH	64	1	1.0	84	1	1.8	84	1	1.9
SEABIRD FORAGING AREA NORTH APRIL-SEPTEMBER	89	2	2.2	92	2	2.5	92	2	2.5
SEABIRD FORAGING AREA NORTH OCTOBER-MARCH	90	2	2.3	93	2	2.6	93	2	2.7
SEA OTTER CONCENTRATION AREA A	20	0	0.2	35	0	0.4	42	0	0.5
SEA OTTER CONCENTRATION AREA B	10	0	0.1	36	0	0.5	50	0	0.7
SEA OTTER CONCENTRATION AREA C	24	0	0.3	44	0	0.6	50	0	0.7
SEA OTTER CONCENTRATION AREA D	38	0	0.5	67	1	1.1	70	1	1.2
SEA OTTER CONCENTRATION AREA E	11	0	0.1	27	0	0.3	30	0	0.4
SEA OTTER CONCENTRATION AREA F	0	0	0.0	0	0	0.0	5	0	0.1
SEA OTTER CONCENTRATION AREA G	53	0	0.8	58	0	0.9	60	0	0.9
SEA OTTER CONCENTRATION AREA H	56	0	0.8	83	1	1.8	85	1	1.9
RED RIVER SALMON SCHOOLING AREA	0	0	0.0	0	0	0.0	1	0	0.0
KARLUK RIVER SALMON SCHOOLING AREA	3	0	0.0	8	0	0.1	9	0	0.1
ROCKY, ALLIGATOR, AND GRASSY ISLANDS AREA	6	0	0.1	16	0	0.2	18	0	0.2
DARK, SENTINEL ISLANDS, AND LATAX ROCKS AREA	3	0	0.0	13	0	0.1	15	0	0.2
BARREN ISLANDS AREA	32	0	0.4	52	0	0.7	58	0	0.9
AUGUSTINE ISLAND AREA	43	0	0.6	65	1	1.0	66	1	1.1
KIUKPALIK, SHAKUN ISLANDS, AND SHAKUN ROCK AREA	12	0	0.1	24	0	0.3	27	0	0.3

Table 29 -- Final probabilities (expressed in percent chance) of one or more spills the most likely number of spills, and the expected number of spills occurring and contacting land segments over the production life of Alternative VI.

SEGMENT	3 DAYS			10 DAYS			30 DAYS		
	PROB	MODE	MEAN	PROB	MODE	MEAN	PROB	MODE	MEAN
1	0	0	0.0	0	0	0.0	0	0	0.00
2	0	0	0.0	0	0	0.0	0	0	0.0
3	0	0	0.0	0	0	0.00	1	0	0.01
4	0	0	0.0	0	0	0.0	0	0	0.00
5	0	0	0.0	0	0	0.0	0	0	0.00
6	0	0	0.0	0	0	0.0	0	0	0.00
7	0	0	0.0	0	0	0.0	0	0	0.00
8	0	0	0.0	0	0	0.00	0	0	0.00
9	0	0	0.0	1	0	0.01	1	0	0.01
10	0	0	0.0	1	0	0.01	1	0	0.01
11	3	0	0.03	4	0	0.04	5	0	0.05
12	4	0	0.04	5	0	0.05	5	0	0.05
13	8	0	0.09	9	0	0.10	10	0	0.10
14	4	0	0.04	6	0	0.06	6	0	0.06
15	16	0	0.17	19	0	0.21	20	0	0.22
16	2	0	0.02	4	0	0.04	4	0	0.04
17	5	0	0.06	8	0	0.08	9	0	0.09
18	0	0	0.00	0	0	0.00	0	0	0.00
19	0	0	0.0	0	0	0.0	0	0	0.0
20	0	0	0.0	0	0	0.00	0	0	0.00
21	0	0	0.0	0	0	0.00	0	0	0.00

Table 26 -- Final probabilities (expressed in percent chance) of one or more spills, the most likely number of spills, and the expected number of spills occurring and contacting targets over the production life of Alternative VI (Shelikof Strait only).

				10 DAYS			30 DAYS		
		DE	MEAN	PROB	MODE	MEAN	PROB	MODE	MEAN
	59	0	0.9	75	1	1.4	80	1	1.6
SEABIRD FORAGING AREA SOUTH APRIL-SEPTEMBER	44	0	0.6	46	0	0.6	46	0	0.6
SEABIRD FORAGING AREA SOUTH OCTOBER-MARCH	48	0	0.7	49	0	0.7	49	0	0.7
SEABIRD FORAGING AREA NORTH APRIL-SEPTEMBER	1	0	0.0	2	0	0.0	4	0	0.0
SEABIRD FORAGING AREA NORTH OCTOBER-MARCH	0	0	0.0	2	0	0.0	3	0	0.0
SEA OTTER CONCENTRATION AREA A	0	0	0.0	0	0	0.0	1	0	0.0
SEA OTTER CONCENTRATION AREA B	0	0	0.0	1	0	0.0	3	0	0.0
SEA OTTER CONCENTRATION AREA C	0	0	0.0	1	0	0.0	2	0	0.0
SEA OTTER CONCENTRATION AREA D	29	0	0.3	35	0	0.4	36	0	0.4
SEA OTTER CONCENTRATION AREA E	6	0	0.1	11	0	0.1	11	0	0.1
SEA OTTER CONCENTRATION AREA F	0	0	0.0	0	0	0.0	3	0	0.0
SEA OTTER CONCENTRATION AREA G	0	0	0.0	0	0	0.0	0	0	0.0
SEA OTTER CONCENTRATION AREA H	1	0	0.0	2	0	0.0	3	0	0.0
RED RIVER SALMON SCHOOLING AREA	0	0	0.0	0	0	0.0	0	0	0.0
KARLUK RIVER SALMON SCHOOLING AREA	3	0	0.0	5	0	0.0	5	0	0.1
ROCKY, ALLIGATOR, AND GRASSY ISLANDS AREA	4	0	0.0	5	0	0.1	6	0	0.1
DARK, SENTINEL ISLANDS, AND LATAX ROCKS AREA	1	0	0.0	1	0	0.0	2	0	0.0
BARREN ISLANDS AREA	0	0	0.0	1	0	0.0	3	0	0.0
AUGUSTINE ISLAND AREA	0	0	0.0	0	0	0.0	0	0	0.0
KIUKPALIK, SHAKUN ISLANDS, AND SHAKUN ROCK AREA	10	0	0.1	14	0	0.2	15	0	0.2

Table 27 -- Final probabilities (expressed in percent chance) of one or more spills, the most likely number of spills, and the expected number of spills occurring and contacting targets over the production life of Alternative VI and the existing leases (CI).

	3 DAYS			10 DAYS			30 DAYS		
	PROB	MODE	MEAN	PROB	MODE	MEAN	PROB	MODE	MEAN
LAND	90	2	2.3	99	4	5.0	100	5	5.8
SEABIRD FORAGING AREA SOUTH APRIL-SEPTEMBER	49	0	0.7	59	0	0.9	60	0	0.9
SEABIRD FORAGING AREA SOUTH OCTOBER-MARCH	63	0	1.0	76	1	1.4	76	1	1.4
SEABIRD FORAGING AREA NORTH APRIL-SEPTEMBER	75	1	1.4	78	1	1.5	78	1	1.5
SEABIRD FORAGING AREA NORTH OCTOBER-MARCH	75	1	1.4	77	1	1.5	77	1	1.5
SEA OTTER CONCENTRATION AREA A	9	0	0.1	15	0	0.2	20	0	0.2
SEA OTTER CONCENTRATION AREA B	4	0	0.0	20	0	0.2	30	0	0.4
SEA OTTER CONCENTRATION AREA C	18	0	0.2	32	0	0.4	36	0	0.4
SEA OTTER CONCENTRATION AREA D	37	0	0.5	59	0	0.9	61	0	0.9
SEA OTTER CONCENTRATION AREA E	10	0	0.1	23	0	0.3	24	0	0.3
SEA OTTER CONCENTRATION AREA F	0	0	0.0	0	0	0.0	4	0	0.0
SEA OTTER CONCENTRATION AREA G	29	0	0.3	31	0	0.4	32	0	0.4
SEA OTTER CONCENTRATION AREA H	49	0	0.7	67	1	1.1	68	1	1.1
RED RIVER SALMON SCHOOLING AREA	0	0	0.0	0	0	0.0	0	0	0.0
KARLUK RIVER SALMON SCHOOLING AREA	3	0	0.0	6	0	0.1	7	0	0.1
ROCKY, ALLIGATOR, AND GRASSY ISLANDS AREA	6	0	0.1	13	0	0.1	14	0	0.1
DARK, SENTINEL ISLANDS, AND LATAX ROCKS AREA	2	0	0.0	10	0	0.1	11	0	0.1
BARREN ISLANDS AREA	24	0	0.3	38	0	0.5	42	0	0.5
AUGUSTINE ISLAND AREA	33	0	0.4	44	0	0.6	45	0	0.6
KIUKPALIK, SHAKUN ISLANDS, AND SHAKUN ROCK AREA	12	0	0.1	22	0	0.2	23	0	0.3

22	0	0	0.00	1	0	0.01	2	0	0.02
23	1	0	0.01	2	0	0.02	3	0	0.03
24	2	0	0.02	3	0	0.03	3	0	0.03
25	0	0	0.0	0	0	0.00	0	0	0.00
26	1	0	0.01	1	0	0.01	1	0	0.01
27	1	0	0.01	1	0	0.01	2	0	0.02
28	0	0	0.0	0	0	0.0	1	0	0.01
29	0	0	0.0	0	0	0.00	0	0	0.00
30	0	0	0.0	0	0	0.00	1	0	0.01
31	0	0	0.0	0	0	0.00	0	0	0.00
32	0	0	0.0	0	0	0.00	1	0	0.01
33	0	0	0.0	0	0	0.0	1	0	0.01
34	0	0	0.0	0	0	0.00	1	0	0.01
35	0	0	0.0	0	0	0.0	0	0	0.00
36	0	0	0.0	0	0	0.0	0	0	0.0
37	0	0	0.0	0	0	0.00	0	0	0.00
38	0	0	0.0	2	0	0.02	2	0	0.02
39	0	0	0.0	0	0	0.00	1	0	0.01
40	0	0	0.00	1	0	0.01	2	0	0.02
41	1	0	0.01	4	0	0.04	4	0	0.04
42	2	0	0.02	3	0	0.03	3	0	0.03
43	0	0	0.00	3	0	0.03	3	0	0.04
44	3	0	0.03	6	0	0.06	6	0	0.06
45	20	0	0.22	23	0	0.26	23	0	0.27
46	2	0	0.02	4	0	0.04	4	0	0.04
47	1	0	0.01	3	0	0.03	3	0	0.03
48	6	0	0.06	9	0	0.09	9	0	0.09
49	2	0	0.02	5	0	0.05	5	0	0.05
50	0	0	0.0	0	0	0.0	0	0	0.00
51	0	0	0.0	0	0	0.0	0	0	0.00
52	0	0	0.0	0	0	0.0	0	0	0.0
53	0	0	0.0	0	0	0.00	0	0	0.00
54	0	0	0.0	0	0	0.0	0	0	0.00
55	0	0	0.0	0	0	0.0	0	0	0.0
56	0	0	0.0	0	0	0.0	0	0	0.00
57	0	0	0.0	0	0	0.0	0	0	0.00
58	0	0	0.0	0	0	0.0	0	0	0.0
59	0	0	0.0	0	0	0.0	0	0	0.00
60	0	0	0.0	0	0	0.00	0	0	0.00
61	0	0	0.0	0	0	0.0	0	0	0.0
62	0	0	0.0	0	0	0.0	0	0	0.0
63	0	0	0.0	0	0	0.0	0	0	0.0
64	0	0	0.0	0	0	0.0	0	0	0.0
65	0	0	0.0	0	0	0.0	0	0	0.0
66	0	0	0.0	0	0	0.0	0	0	0.0
67	0	0	0.0	0	0	0.0	0	0	0.0
68	0	0	0.0	0	0	0.0	0	0	0.0
69	0	0	0.0	0	0	0.0	0	0	0.0
70	0	0	0.0	0	0	0.0	0	0	0.0
71	0	0	0.0	0	0	0.0	0	0	0.0
72	0	0	0.0	0	0	0.0	0	0	0.0
73	0	0	0.0	0	0	0.0	0	0	0.00
74	0	0	0.0	0	0	0.0	0	0	0.0
75	0	0	0.0	0	0	0.0	0	0	0.0
76	0	0	0.0	0	0	0.0	0	0	0.0
77	0	0	0.0	0	0	0.0	0	0	0.0
78	0	0	0.0	0	0	0.0	0	0	0.0
79	0	0	0.0	0	0	0.00	0	0	0.00
80	0	0	0.0	0	0	0.00	1	0	0.01
81	0	0	0.00	0	0	0.00	1	0	0.02
82	0	0	0.0	0	0	0.00	0	0	0.00
83	0	0	0.0	0	0	0.00	1	0	0.01
84	0	0	0.0	0	0	0.00	1	0	0.01
85	0	0	0.0	0	0	0.00	0	0	0.00
86	0	0	0.0	0	0	0.0	0	0	0.00
87	0	0	0.0	0	0	0.0	0	0	0.00
88	0	0	0.0	0	0	0.0	0	0	0.00
89	0	0	0.0	0	0	0.0	0	0	0.0
90	0	0	0.0	0	0	0.0	0	0	0.00
91	0	0	0.0	0	0	0.0	0	0	0.0
92	0	0	0.0	0	0	0.0	0	0	0.00
93	0	0	0.0	0	0	0.0	0	0	0.0
94	0	0	0.0	0	0	0.0	0	0	0.0
95	0	0	0.0	0	0	0.0	0	0	0.0
96	0	0	0.0	0	0	0.0	0	0	0.0

Table 30 -- Final probabilities (expressed in percent chance) of one or more spills, the most likely number of spills, and the expected number of spills occurring and contacting land segments over the production life of Alternative VI and the existing leases (C-1).

SEGMENT	3 DAYS			10 DAYS			30 DAYS		
	PROB	MODE	MEAN	PROB	MODE	MEAN	PROB	MODE	MEAN
1	0	0	0.0	0	0	0.0	0	0	0.00
2	0	0	0.0	0	0	0.0	0	0	0.0
3	0	0	0.0	0	0	0.00	2	0	0.02
4	0	0	0.0	0	0	0.0	1	0	0.01
5	0	0	0.0	0	0	0.0	0	0	0.00
6	0	0	0.0	0	0	0.0	0	0	0.00
7	0	0	0.0	0	0	0.0	1	0	0.01
8	0	0	0.0	0	0	0.00	1	0	0.01
9	0	0	0.0	1	0	0.01	2	0	0.02
10	0	0	0.0	1	0	0.01	2	0	0.02
11	3	0	0.03	6	0	0.06	7	0	0.07
12	4	0	0.04	9	0	0.09	9	0	0.10
13	10	0	0.10	19	0	0.21	20	0	0.22
14	6	0	0.07	14	0	0.15	14	0	0.16
15	18	0	0.20	27	0	0.31	28	0	0.33
16	3	0	0.03	10	0	0.10	10	0	0.11
17	7	0	0.07	19	0	0.21	20	0	0.23
18	1	0	0.01	4	0	0.05	5	0	0.05
19	0	0	0.0	0	0	0.00	0	0	0.00
20	0	0	0.00	1	0	0.01	1	0	0.01
21	0	0	0.0	0	0	0.00	1	0	0.01
22	0	0	0.00	2	0	0.02	2	0	0.02
23	1	0	0.01	2	0	0.02	3	0	0.03
24	2	0	0.02	3	0	0.03	4	0	0.04
25	0	0	0.0	0	0	0.00	0	0	0.00
26	1	0	0.01	1	0	0.01	1	0	0.01
27	1	0	0.01	1	0	0.01	2	0	0.02
28	0	0	0.0	0	0	0.0	1	0	0.01
29	0	0	0.0	1	0	0.01	1	0	0.01
30	0	0	0.0	0	0	0.00	2	0	0.02
31	0	0	0.0	0	0	0.00	0	0	0.00
32	0	0	0.0	0	0	0.00	1	0	0.01
33	0	0	0.0	0	0	0.0	2	0	0.02
34	0	0	0.0	0	0	0.00	2	0	0.02
35	0	0	0.0	0	0	0.00	1	0	0.01
36	0	0	0.0	0	0	0.0	0	0	0.00
37	0	0	0.0	0	0	0.00	1	0	0.01
38	0	0	0.0	3	0	0.03	3	0	0.04
39	0	0	0.0	1	0	0.01	2	0	0.02
40	0	0	0.00	3	0	0.03	4	0	0.04
41	1	0	0.01	5	0	0.05	5	0	0.06
42	2	0	0.02	5	0	0.05	6	0	0.06
43	0	0	0.00	5	0	0.06	7	0	0.07
44	3	0	0.03	11	0	0.11	11	0	0.12
45	23	0	0.26	37	0	0.46	37	0	0.46
46	4	0	0.04	10	0	0.11	11	0	0.12
47	1	0	0.01	4	0	0.05	5	0	0.05
48	6	0	0.07	12	0	0.12	13	0	0.14
49	4	0	0.04	10	0	0.11	13	0	0.14
50	3	0	0.03	5	0	0.05	6	0	0.06
51	1	0	0.01	2	0	0.02	2	0	0.02
52	0	0	0.0	0	0	0.00	0	0	0.00
53	13	0	0.13	21	0	0.24	21	0	0.24
54	19	0	0.21	32	0	0.39	33	0	0.40
55	0	0	0.00	2	0	0.02	2	0	0.02
56	19	0	0.22	27	0	0.32	29	0	0.34
57	0	0	0.00	1	0	0.01	1	0	0.01
58	3	0	0.03	8	0	0.09	9	0	0.10
59	6	0	0.06	11	0	0.12	11	0	0.12
60	7	0	0.07	12	0	0.13	12	0	0.13
61	1	0	0.01	3	0	0.03	3	0	0.03
62	0	0	0.00	4	0	0.04	4	0	0.04
63	0	0	0.00	3	0	0.03	3	0	0.03
64	0	0	0.00	6	0	0.06	7	0	0.07
65	0	0	0.0	1	0	0.01	1	0	0.01
66	0	0	0.0	1	0	0.01	2	0	0.02
67	0	0	0.0	0	0	0.00	0	0	0.00

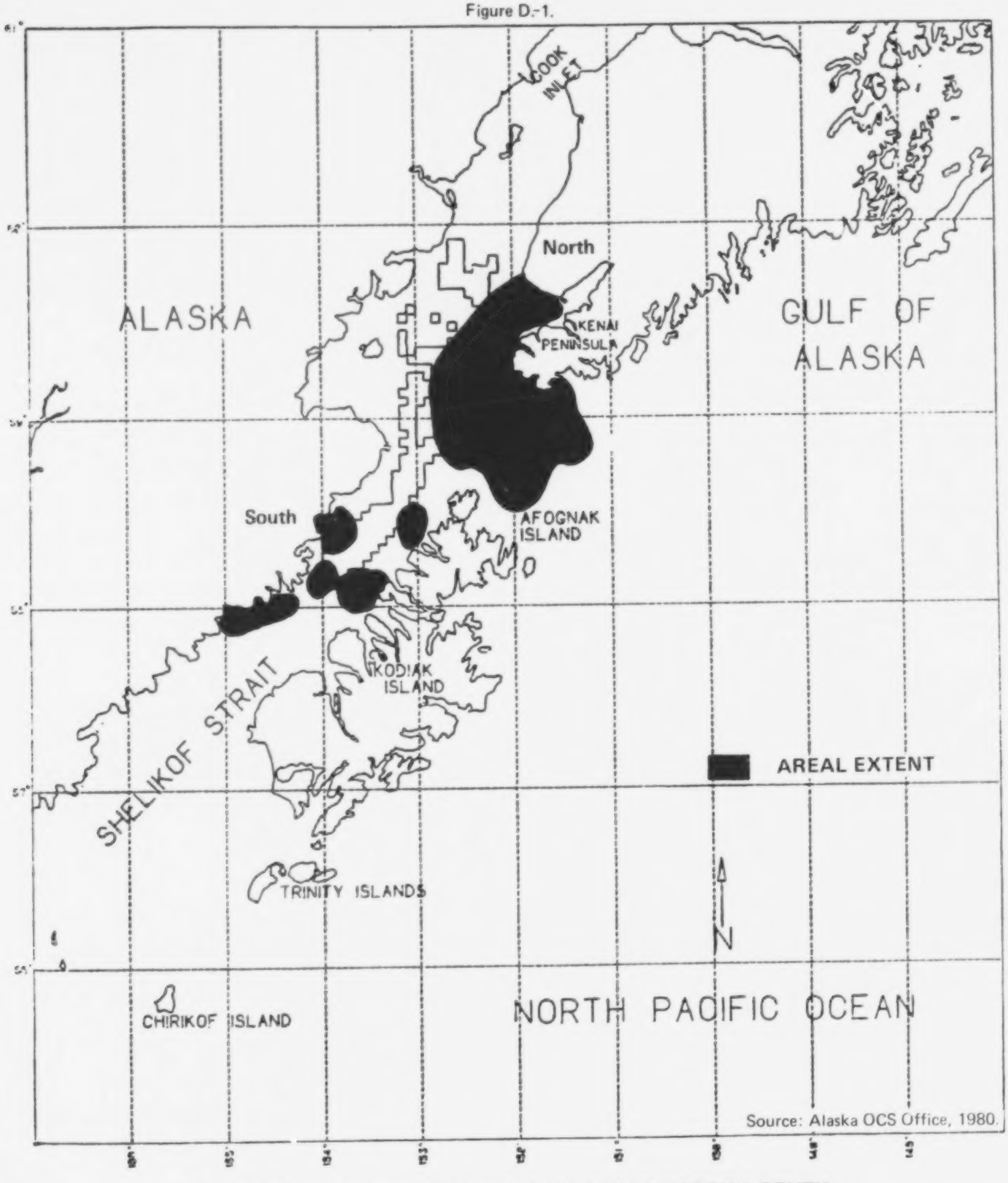
68	0	0	0.0	0	0	0.0	0	0	0.0
69	0	0	0.0	0	0	0.00	0	0	0.00
70	0	0	0.00	2	0	0.02	2	0	0.02
71	0	0	0.0	0	0	0.00	0	0	0.00
72	1	0	0.01	1	0	0.01	1	0	0.01
73	0	0	0.00	1	0	0.01	1	0	0.01
74	1	0	0.01	2	0	0.02	2	0	0.02
75	18	0	0.19	20	0	0.22	20	0	0.23
76	0	0	0.00	1	0	0.01	1	0	0.01
77	0	0	0.00	0	0	0.00	1	0	0.01
78	0	0	0.00	1	0	0.01	2	0	0.02
79	3	0	0.03	7	0	0.08	9	0	0.10
80	4	0	0.04	9	0	0.09	12	0	0.13
81	7	0	0.08	17	0	0.19	20	0	0.22
82	5	0	0.05	9	0	0.09	10	0	0.11
83	1	0	0.01	7	0	0.07	9	0	0.10
84	1	0	0.01	4	0	0.04	7	0	0.07
85	0	0	0.00	3	0	0.03	4	0	0.04
86	0	0	0.0	1	0	0.01	4	0	0.04
87	0	0	0.0	1	0	0.01	1	0	0.01
88	0	0	0.0	0	0	0.00	1	0	0.01
89	0	0	0.0	0	0	0.0	1	0	0.01
90	0	0	0.0	0	0	0.0	0	0	0.00
91	0	0	0.0	0	0	0.0	1	0	0.01
92	0	0	0.0	0	0	0.0	1	0	0.01
93	0	0	0.0	0	0	0.0	1	0	0.01
94	0	0	0.0	0	0	0.0	1	0	0.01
95	0	0	0.0	0	0	0.0	0	0	0.0
96	0	0	0.0	0	0	0.0	0	0	0.0

Table 31 -- Final probabilities (expressed in percent chance) of one or more spills, the most likely number of spills, and the expected number of spills occurring and contacting land segments over the production life of Alternative VI existing leases (C-1) and existing tanker transportation (including upper Cook Inlet).

SEGMENT	3 DAYS			10 DAYS			30 DAYS		
	PROB	MODE	MEAN	PROB	MODE	MEAN	PROB	MODE	MEAN
1	0	0	0.0	0	0	0.0	0	0	0.00
2	0	0	0.0	0	0	0.0	0	0	0.0
3	0	0	0.0	0	0	0.00	2	0	0.02
4	0	0	0.0	0	0	0.0	3	0	0.03
5	0	0	0.0	0	0	0.0	0	0	0.00
6	0	0	0.0	0	0	0.0	0	0	0.00
7	0	0	0.0	0	0	0.0	1	0	0.01
8	0	0	0.0	0	0	0.00	1	0	0.01
9	0	0	0.0	1	0	0.01	2	0	0.02
10	0	0	0.0	1	0	0.01	3	0	0.03
11	3	0	0.03	7	0	0.08	9	0	0.10
12	4	0	0.04	10	0	0.11	12	0	0.12
13	10	0	0.10	23	0	0.26	24	0	0.28
14	6	0	0.07	18	0	0.19	19	0	0.21
15	18	0	0.20	30	0	0.36	32	0	0.38
16	3	0	0.03	12	0	0.13	13	0	0.14
17	7	0	0.07	23	0	0.26	26	0	0.30
18	1	0	0.01	7	0	0.07	8	0	0.08
19	0	0	0.0	0	0	0.00	0	0	0.00
20	1	0	0.01	2	0	0.02	2	0	0.02
21	0	0	0.0	0	0	0.00	1	0	0.01
22	0	0	0.00	2	0	0.02	3	0	0.03
23	1	0	0.01	2	0	0.02	4	0	0.04
24	2	0	0.02	3	0	0.03	5	0	0.05
25	0	0	0.0	0	0	0.00	0	0	0.00
26	1	0	0.01	1	0	0.01	1	0	0.01
27	1	0	0.01	1	0	0.01	3	0	0.03
28	0	0	0.0	0	0	0.0	2	0	0.02
29	0	0	0.0	1	0	0.01	2	0	0.02
30	0	0	0.0	0	0	0.00	4	0	0.04
31	0	0	0.0	0	0	0.00	0	0	0.00

32	0	0	0.0	0	0	0.00	1	0	0.01
33	0	0	0.0	0	0	0.0	3	0	0.03
34	0	0	0.0	1	0	0.01	3	0	0.03
35	0	0	0.0	1	0	0.01	3	0	0.03
36	0	0	0.0	0	0	0.0	0	0	0.00
37	0	0	0.0	0	0	0.00	1	0	0.01
38	0	0	0.0	3	0	0.03	4	0	0.04
39	0	0	0.0	1	0	0.01	2	0	0.02
40	0	0	0.00	4	0	0.04	5	0	0.05
41	1	0	0.01	6	0	0.06	7	0	0.07
42	2	0	0.02	6	0	0.06	7	0	0.07
43	0	0	0.00	6	0	0.06	8	0	0.08
44	3	0	0.03	13	0	0.13	14	0	0.15
45	23	0	0.26	41	0	0.52	42	0	0.54
46	4	0	0.04	12	0	0.13	15	0	0.16
47	1	0	0.01	5	0	0.05	6	0	0.07
48	6	0	0.07	13	0	0.14	15	0	0.17
49	4	0	0.05	12	0	0.13	16	0	0.18
50	3	0	0.63	7	0	0.07	8	0	0.09
51	1	0	0.01	2	0	0.02	2	0	0.02
52	0	0	0.0	0	0	0.00	0	0	0.00
53	14	0	0.15	27	0	0.31	27	0	0.32
54	23	0	0.26	49	0	0.67	50	0	0.70
55	0	0	0.00	3	0	0.04	4	0	0.04
56	23	0	0.26	44	0	0.58	45	0	0.61
57	0	0	0.00	1	0	0.01	3	0	0.03
58	3	0	0.03	13	0	0.14	16	0	0.17
59	6	0	0.06	15	0	0.17	17	0	0.18
60	8	0	0.08	18	0	0.20	20	0	0.22
61	2	0	0.02	7	0	0.07	8	0	0.08
62	0	0	0.00	8	0	0.08	9	0	0.09
63	0	0	0.00	7	0	0.07	7	0	0.07
64	10	0	0.11	29	0	0.34	30	0	0.36
65	0	0	0.0	2	0	0.02	2	0	0.02
66	0	0	0.0	5	0	0.05	5	0	0.05
67	0	0	0.0	1	0	0.01	1	0	0.01
68	0	0	0.0	0	0	0.00	0	0	0.00
69	0	0	0.0	0	0	0.00	0	0	0.00
70	3	0	0.04	9	0	0.10	9	0	0.10
71	0	0	0.0	0	0	0.00	0	0	0.00
72	1	0	0.01	2	0	0.02	2	0	0.02
73	1	0	0.01	2	0	0.02	3	0	0.03
74	2	0	0.02	5	0	0.05	6	0	0.06
75	35	0	0.43	40	0	0.52	41	0	0.53
76	1	0	0.01	2	0	0.02	3	0	0.03
77	0	0	0.00	1	0	0.01	2	0	0.02
78	0	0	0.00	1	0	0.01	3	0	0.04
79	7	0	0.08	20	0	0.23	23	0	0.27
80	8	0	0.08	18	0	0.19	22	0	0.25
81	8	0	0.09	24	0	0.28	29	0	0.34
82	7	0	0.07	13	0	0.14	15	0	0.16
83	2	0	0.02	13	0	0.13	16	0	0.18
84	1	0	0.01	8	0	0.09	12	0	0.13
85	1	0	0.01	6	0	0.06	9	0	0.09
86	0	0	0.0	3	0	0.03	8	0	0.08
87	0	0	0.0	1	0	0.01	3	0	0.03
88	0	0	0.0	0	0	0.00	2	0	0.02
89	0	0	0.0	0	0	0.0	2	0	0.02
90	0	0	0.0	0	0	0.0	1	0	0.01
91	0	0	0.0	0	0	0.0	3	0	0.03
92	0	0	0.0	0	0	0.0	2	0	0.02
93	0	0	0.0	0	0	0.0	1	0	0.01
94	0	0	0.0	0	0	0.0	2	0	0.02
95	0	0	0.0	0	0	0.0	0	0	0.0
96	0	0	0.0	0	0	0.0	0	0	0.0

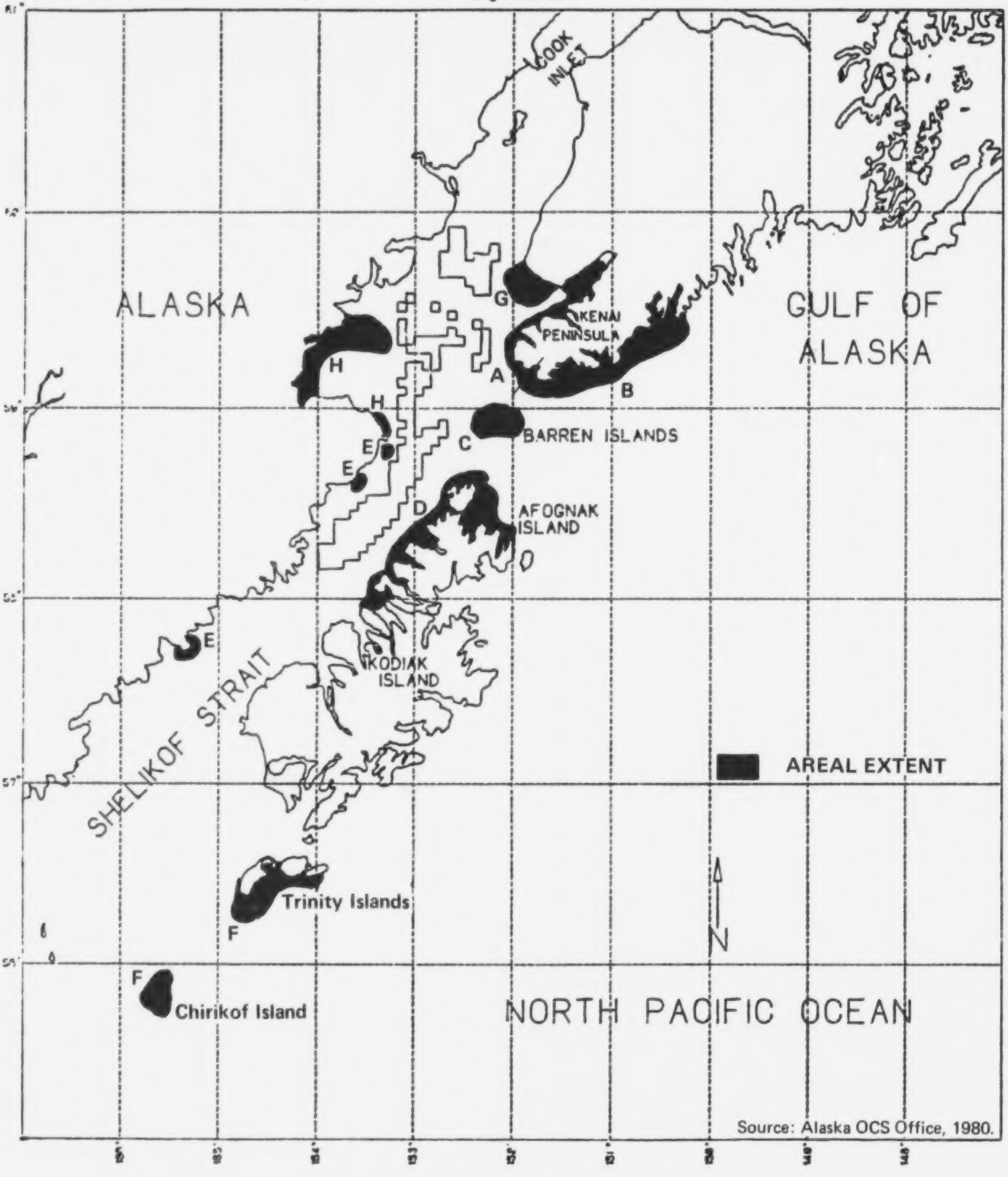
Figure D.-1.


COOK INLET
North
ALASKA
KENAI PENINSULA
GULF OF ALASKA
South
AFOGNAK ISLAND
KODIAK ISLAND
SHELIKOF STRAIT
AREAL EXTENT
TRINITY ISLANDS
N
CHIRIKOF ISLAND
NORTH PACIFIC OCEAN

Source: Alaska OCS Office, 1980.

LOCATION OF SEABIRD FORAGING AREAS, NORTH & SOUTH, OF COOK INLET OCS SALE 60

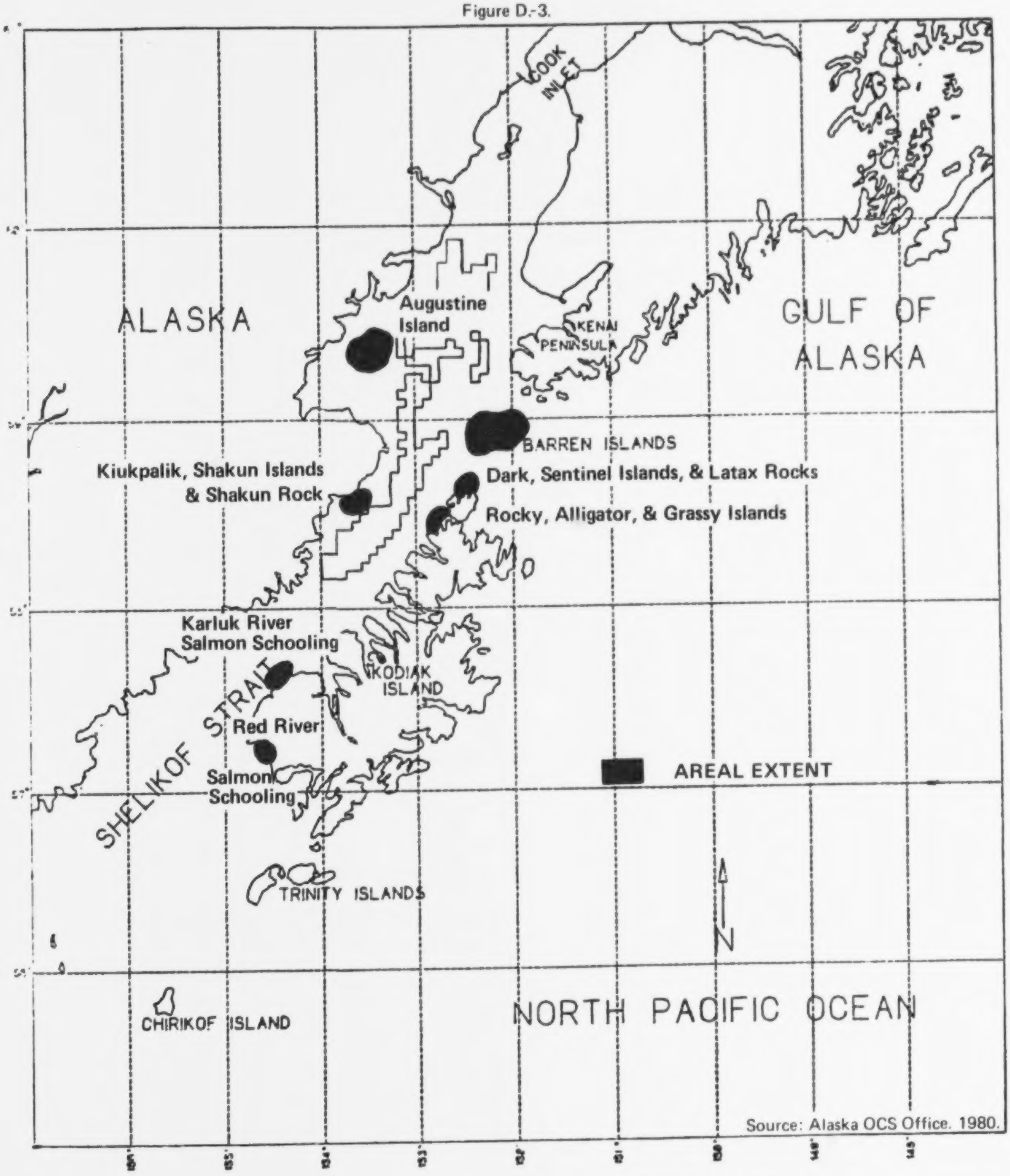
Figure D.-2.


COOK INLET
ALASKA
GULF OF ALASKA
G
KENAI PENINSULA
H
A
B
H
BARREN ISLANDS
E
C
E
D
AFOGNAK ISLAND
E
KODIAK ISLAND
SHELIKOF STRAIT
AREAL EXTENT
N
Trinity Islands
F
F
Chirikof Island
NORTH PACIFIC OCEAN

Source: Alaska OCS Office, 1980.

LOCATION OF SEA OTTER CONCENTRATION AREAS A THROUGH H, COOK INLET OCS SALE 60

Figure D.-3.


COOK INLET
ALASKA
Augustine Island
KENAI PENINSULA
GULF OF ALASKA
BARREN ISLANDS
Kiukpalik, Shakun Islands & Shakun Rock
Dark, Sentinel Islands, & Latax Rocks
Rocky, Alligator, & Grassy Islands
Karluk River Salmon Schooling
KODIAK ISLAND
SHELIKOF STRAIT
Red River
Salmon Schooling
AREAL EXTENT
TRINITY ISLANDS
N
CHIRIKOF ISLAND
NORTH PACIFIC OCEAN

Source: Alaska OCS Office. 1980.

THE LOCATIONS OF 7 TARGETS, COOK INLET AND SHELIKOF STRAIT OCS LEASE SALE 60.

APPENDIX E

INVENTORY AND LOCATION OF POLLUTION CLEANUP EQUIPMENT AND MATERIALS, COOK INLET RESPONSE ORGANIZATION (CIRO) AND GULF OF ALASKA CLEANUP ORGANIZATION (GOACO)

CIRO OWNED/GOACO USE AGREEMENT EQUIPMENT INVENTORY

Revised 1/17/80

CLASS	TYPE/DESCRIPTION	QUANTITY	LOCATION
Oil Recovery	Acme Skimmer	1	Kenai Pipeline yard. Kenai, AK
Support Vans	Command & Control Vans - 40' - personnel and cummunication support	1	Kenai Pipeline yard. Kenai, AK
		1	City Dock Anchorage, AK
Oil Containment Booms	Vikoma Seapack 23' hull with 1450' of inflatable boom and related equipment does not include tow vessel.	1 1450'	Homer, AK
	Whittaker Expandi Boom 4300 - 43" skirt open water oil containment 200' sections	2000'	Kenai Pipeline yard. Kenai, AK
	Aqua Fence Open Water 30" Skirt	1000'	Kenai Pipeline yard. Kenai, AK
	Acme Harbor Boom - 12' Skirt - 200' Sections	1000'	Kenai Pipeline yard. Kenai, AK
		1000'	City Dock Anchorage, AK
Oil/Water Separators	200 Bbl Oil Separator Tanks	2 ea.	Kenai Pipeline yard. Kenai, AK
Oil Storage	100 Bbl Holding Tanks Marine Portable Skid Mounted	2	Kenai Pipeline yard. Kenai, AK
	Pillow Tank Firestone Fabri-tank, 25,000 US Gal.	1	Kenai Pipeline yard. Kenai, AK
	Inflatable Tank, Dunlap, towable, 2,500 U.S. Gal. Three 20' sections of tow hose.	1	Kenai Pipeline yard. Kenai, AK

CLASS	TYPE/DESCRIPTION	QUANTITY	LOCATION
Dispersants	Exxon Corexit 9527	102	Kenai Pipeline yard, ARCO Yard Kenai, AK
	" " "	90	
	" " "	90	Manley Terminal Homer, AK
	Exxon Collectant OC-5 (Herder)	1	Anchorage (CES)
Aerial Spray Units	Simplex/Aerial Spray Unit 200 Gal. capacity	2	Manley Warehouse Homer, AK Kenai Pipeline Kenai, AK
	Helo Spray Unit, 600 Gal. capacity	1	Kenai Pipeline yard. Kenai, AK
Bird Protection	Scare Away Model M-Y Propane filled.	20	Kenai Pipeline yard. Kenai, AK ARCO Warehouse Kenai, AK
		19	Anchorage (CES)
		1	Anchorage (CES)
Oil Recovery Systems Skimmers	RECOVERER II - Lockheed 3100 self-propelled/Bay Harbor	1	City Dock Anchorage, AK
	Cyclonet 120 - M/V RIG ENGINEER modified for installation. High seas capability.	1	Rig Tenders Nikiski, AK
	RECOVERER - Cyclonet 070 Self-propelled. Open sea. Bay capability.	1	Onshore Homer, AK
	Cyclonet 050 Zodiac Boat 50 hp Mercury outboard, Bay/Harbor capability	1	Manley Terminal #3, Homer, AK
	Komara Mini Skimmers w/ Power pack	2	Manley Terminal #3, Homer, AK 1 KPH Property, Nikiski, AK

CLASS	TYPE/DESCRIPTION	QUANTITY	LOCATION
Work Boat	19' Zodiac 70 HP Volvo Penta O/B	1	Kenai, AK
Sorbents	Conwed Sorbent Blanket, Bale 150' x 30" x 3/8"	50 Bales	Kenai Pipeline yard. Kenai, AK
	Conwed Sorbent Pad 110 pads per bale 17" x 17"	23 Bales	ARCO yard Kenai, AK
	Conwed Sorbent Pillow 20 per Bale 18" x 12" x 4"	1 Bale	
	3M Sorbent Pads, Type 156 100 18x18x3/8 pads per Bale	18 Bales	
	3M Sorbent Sweeps Type 126 100' x 22" x 3/8" per Bale	10 Bales	
	3M Sorbent Boom Type 270 4 10' x 8" Boom per Bale	94 Bales	

The following equipment is also available in Kenai:

Quantity	Type	
1	Electric Generator, 3 KW, portable, gasoline powered with 2 flood lights, 100 w on tripod, 3 electrical leads, 75 ft.	GOACO
1	Electric Generator 7.5 KW, portable, gasoline powered. 110-220 volt.	CIRO
1	Air Compressor or 150 PSI 220, single phase	GOACO
20	Containment Boom Marker Lights.	GOACO
1	Vacuum cleaner, tank type, wet/dry.	GOACO
2	Barrel Pumps (hand op.).	GOACO
140'	3" Sunction hose (Camlock Fittings) 7 20' sections.	GOACO
140'	4" Sunction hose (Camlock Fittings) 7 20' sections.	GOACO
300'	3" Discharge hose (Camlock Fittings) 6 50' sections.	GOACO
300'	4" Discharge hose (Camlock Fittings) 6 50' sections.	GOACO
4	Diesel-powered, electric start Gorman Rupp trash pumps with fire/wash down nozzle attachment.	GOACO

GULF OF ALASKA CLEANUP ORGANIZATION

Inventory and Location of Equipment/Material

April 15, 1980

Function	Description	Quantity	Location
Command and Control	40' Vans, equipped to conduct management of the cleanup operation. (See Enclosure 1 complete list of items/equipment contained in each Van.)	2	Van #4 Anchorage Van #5 Kenai
Communications	Mobile Radio Repeaters (100 Watt) Receive on 459 MHZ/ Transmit on 454 MHZ.	2	Van #4 Anchorage Van #5 Kenai
	Base Station UHF Antenna, mounted on the 40' Command Center Vans, for use with Repeaters or Handheld MX-330 Radios.	2	Van #4 Anchorage Van #5 Kenai
	Marine Band; VHF transceivers (25 watt) Motorola Nautilus 440 with antennas.	2	Van #4 Anchorage Van #5 Kenai
	Aviation Band; 720 channels, 7 watts, King KY-92 transceivers (118 MHZ-136 MHZ)	2	Van #4 Anchorage Van #5 Kenai
	UHF/FM Handheld Radio, Motorola MX-330. Transmits on 459 MHZ or 454 MHZ. Receives only on 454 HMZ. Battery operated.	12	Anchorage
	Battery Chargers, Multiple and Single.	6	Anchorage
	Spare Batteries for MX-330 Radios.	12	Anchorage
	Citizen Band Radio w/antenna.	2	Van #4 Anchorage Van #5 Kenai
	Telephone System, 10 stations per command Center Van, PBX, intercom between all stations.		Van #4 Anchorage Van #5 Kenai

Function	Description	Quantity	Location
Storage/Fast Response	40' Vans, used to store material/equipment and to transport to spill site.	3	Van #1 Yakutat Van #2 Yakutat Van #3 Kenai
Containment of Oil	Wittaker Expandi Boom Model 4300 Seaboom (1000'/pallet, wt. 4,000#)	3000'	1000' Yakutat 2000' Kenai
	Acme Corral Boom (8" freeboard, 12" skirt, 200' section) (1000'/Trailer, 1000' Boom wt. 1,500#)	3000'	
	Marker lights for containment booms	20	Van #5 Kenai
Oil Pick Up	Cyclonet 150 Open Ocean Skimmer At 3-6 kts oil recovery rates range to 1,600 gallons/min. will operate in 10 ft. seas. Total system wt. apx. 75 tons	1	Stored in Long Beach, California
	Komara Miniskimmer, rotating disc type, maximum recovery rate of crude is 10 tons/hour (13 gal/min) Skimmer wt. 120# Hydraulic power pack wt. 330# Electric start.	2	Yakutat Kenai
	Acme Skimmer, 39TG-4 Wier is variable, and will pump 25 to 275 gal/min at a maximum head of 30 feet. Weight is 138 lb.	2	Yakutat Kenai
	Sorbent Boom, 3M Type 270 5, 8' x 8" booms/bale	40	Van #2 Yakutat
	Sorbent Blanket, 3M Type 100 One 150' x 30 " x 3/8" per roll	41	Van #2 Yakutat
	Sorbent Pad, 3M Type 156 100 18" x 18" x 3/8" per bale	14	Van #2 Yakutat
	Sorbent Pillow, 3M Type 240 10 5" x 14" pillows per bale	5	Van #2 Yakutat

Function	Description	Quantity	Location
Oil Pick Up (continued)	Sorbent Boom, 3M Type 270 5 8' x 8" booms/bale	74	Van #3 Kenai
	Sorbent Boom, 3M Type 270 5 8'x 8" booms/bale	20	Van #4 Anchorage
	Sorbent Blanket, Conwed One 150' 30" x 3/8" per roll	50	Kenai
	Sorbent Pad, Conwed 17½" x 17½" x ¼" (110/bale)	23	Kenai
	Sorbent Pillow, Conwed 18" x 12" x 4" (20/bale)	1	Kenai
	Sorbent Sweep, 3M Type (one 100'-22" x 3/8"/bale)	10	Kenai
	Sorbent Pads, 3M Type (100-18" x 18" 3/8"/bale)	18	Kenai
Oil/Water Separation	200 bbl Oil/Water Separator Tanks mounted on 40' flatbed, rated at 90,000# gross wt. Designed for use with Cyclonet 150 system. Can be used separately or for storage. Marine Portable on skids.	2	Van #8, Van #9 Kenai
Product Storage	100 bbl holding and separator tanks. Marine Portable on skids, stored on 60,000 lb. gross wt. 40' flatbed.	2	Van #6, Van #7 Kenai
	Pillow Tank, Firestone Frabritank 25,000 gal. Stored on flatbed (empty wt. 2,600 lb)	2	Van #1 Yakutat Van #7 Kenai
	Inflatable, Dracone Dunlop Towable Tank. 2,500 gal. (empty wt. 700 lb) Stored on flatbed.	2	Van #1 Yakutat Van #6 Kenai
Aerial Spraying	Helicopter Dispersant Applicator. Self powered, independent controls in cockpit. Empty wt. 705#, with payload (612 gal) - 5,600#	2	Van #1 Yakutat Van #3 Kenai

Function	Description	Quantity	Location
Dispersants	Exxon Corexit 9527 (36 drums in Van #3 Kenai)	102 Drums 80 Drums	Kenai Yakutat
Collectants	Exxon OC-5	5 Drums 1 Drum	Yakutat Kenai
Bird/Sea Mammal Protection	Scare away Model M-Y, propane fired, with individual propane tanks.	20	5 Anchorage 5 Kenai 10 ARCO Yard, Kenai
Workboats	Zodiak 19' Mark V inflatable workboat (equipped with outboard motors and safety equipment).	2	1 Yakutat 1 Kenai
Transportation/Storage	40' Modified Vans, equipped as an Operations Center and for storage of oilspill response materials.	5	2 Yakutat 2 Kenai 1 Anchorage
	40' Flatbed Trailers, selectively loaded with tanks, booms, skimmers for fast response.	4	4 Kenai
	19' Boat Trailers	2	1 Yakutat 1 Kenai
	Acme Boom/Skimmer Trailers	3	1 Yakutat 1 Kenai 1 Anchorage
Pumps and Power Packs	Trash Pumps, Gorman Rupp, 4", Diesel powered, electric start. (Fire/wash down nozzle attachment.)	4	4 Kenai
	Barrel Pump (hand operated)	1	Kenai
	Diesel power, Hydraulic power pack for Cyclonet 150 operations.	1	Kenai

Function	Description	Quantity	Location
Lighting	Portable Flood Lights, two (2) 1000 watt lights on tripod/ electrical leads.	2	Van #1 Yakutat Van #5 Kenai
Generators	Gasoline Generator, portable 3000 watts.	2	Van #1 Yakutat Van #4 Anchorage
Hoses	3" Suction Hose (Kamlock fittings)(3 20' sections)	60'	Yakutat
	3" Discharge Hose (Kamlock fittings)(2 50' sections)	100'	Yakutat
	4" Suction Hose (Kamlock fittings)(3 20' sections)	60'	Yakutat
	4" Discharge Hose (Kamlock fittings)(2 50' sections)	100'	Yakutat
	3" Suction Hose (Kamlock fittings)(7 20' sections)	140'	Kenai
	4" Discharge Hose (Kamlock fittings)(6 50' sections)	300'	Kenai
	4" Suction Hose (Kamlock fittings)(7 20' sections)	140'	Kenai
	4" Discharge Hose (Kamlock fittings)(6 50' sections)	300'	Kenai
Heating	Herman Nelson, BT-400-10 Gasoline Heaters (400,000 BTU cap)	2	Anchorage
Support	Vacuum Cleaners, tank type, wet or dry type, for use with Expandi Boom	2	Van #1 Yakutat Van #5 Kenai
	Hand Sprayers, 4 gal., dispersant applicators	4	2 Yakutat 2 Kenai
	Air Compressor, 150 psi 220v single phase	1	Kenai

Function	Description	Quantity	Location
Training	Slide Projector	1	Anchorage
	Camera SX-70	1	Anchorage
	Camera Cannon AE-1	1	Anchorage
	Video Tape Player/Recorder (to view training tapes)	1	Anchorage
	NUS Training Tapes, Oilspill Cleanup Series	23	Anchorage

GULF OF ALASKA CLEANUP ORGANIZATION

Command and Control Vans
Operations Center

Two 40' Semi Trailers have been equipped for Command Center oilspill cleanup operations. Each Van has a self-contained power plant, lighting, and heating system. The communication package used in the Vans is packaged in a manner to allow removal and use in a remote command center location. Listed below is a typical inventory contained in GOACO Vans #4 and #5:

a) Foul weather clothing/footwear for 12 people.
b) Two MSA Air Masks (Model #401, pressure demand).
c) Two fire/flame protections suits.
d) One resuscitator (MSA Portolator).
e) Spare parts for small engines, pumps, and generators.
f) Medical Kits for each Van and individual kits for 12 persons.
g) Oxygen and Masks for emergency medical use.
h) Steam/Hot Water cleaning machine (Anchorage).
i) Fire Extinguishers.
j) Cleaning materials and perservatives for equipment.
k) Small refrigerator.
l) Aluminum ladder.
m) Warn electric winch.
n) Equipped with rear loading ramp.
o) Four built-in bunks per van/with blankets (8 total).
p) Nylon line.
q) Antenna for UHF frequency (454.-459. MHZ), Antenna for VHF Marine Band, and Antenna for Aviation Band, Citizen Band.
r) 40' Van spare tires and rims.
s) Twelve (12) tables, twenty-four (24) chairs.
t) 110V extension cords (100').
u) Wind Speed and Direction Indicator.
v) Charts and Display Boards.
w) Clock.

Communication System

10 Station per Van #4 & #5 Telephone PBX System with 20 Station Intercom.

Radio, UHF-FM, hand held, Motorola MX-330. Transmit on 454. or 459. MHZ. Receives ONLY 454. MHZ. Type H44, battery operated with:

4 - Battery Chargers, Single
2 - Battery Chargers, Multiple

Mobile UHF-FM radio repeaters (100 Watt). Receive on 459. MHZ, transmit on 454. MHZ.

Marine Band, VHF Transceivers.

Aviation Band VHF Transceivers.

Citizen Band Transceivers.

APPENDIX F

OFFSHORE OIL POLLUTION COMPENSATION FUND

Refer to the DEIS for the text to this appendix
or to 44 FR 16860

APPENDIX G

FISHERMEN'S CONTINGENCY FUND

Refer to the DEIS for the text to this appendix
or to 45 FR 6062

APPENDIX H

BIOLOGICAL OPINION ON ENDANGERED WHALES AS REQUIRED UNDER SECTION 7 OF THE ENDANGERED SPECIES ACT OF 1973 AS AMENDED

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Washington, D.C. 20235

F/MM:CK

MAY 23 1980

Mr. Frank Gregg
Director, Bureau of Land Management
Department of the Interior
Washington, D.C. 20240

Dear Mr. Gregg:

This responds to your letter of January 24, 1980, in which the Bureau of Land Management (BLM) and the U.S. Geological Survey (USGS) requested initiation of formal procedures for a joint regional consultation on the Outer Continental Shelf (OCS) oil and gas program in the Gulf of Alaska area. Consultation was requested for all operations pertaining to oil and gas leasing and exploration for the total area involved in Lease Sales 46 (Kodiak), 55 (Eastern Gulf of Alaska), and 60 (Cook Inlet-Shelikof Strait).

You also requested that the Draft Environmental Statements for proposed Lease Sales 46 and 55 and the biological assessment of endangered whales in the proposed eastern Gulf of Alaska, Kodiak Island, and Cook Inlet Lease Areas serve in lieu of a formal consultation meeting. We find these documents provide sufficient information to prepare a biological opinion and that a formal consultation meeting is not necessary at this time.

Endangered Whales in the Gulf of Alaska

Seven species of endangered whales (gray, right, blue, fin, sei, sperm, and humpback) are present seasonally in the Gulf of Alaska area from late spring into early autumn (approximately May through September) as described in the biological assessment. Of these only the humpback appears to summer in significant numbers in or near the area encompassed by the three lease sales. The other species are thought to occur in the area mostly as transients during both spring and fall migrations. Except for the gray whale, which is restricted to the North Pacific Ocean, all of these endangered whales are worldwide, or nearly worldwide, in distribution. All seven species occur in the Kodiak and Eastern Gulf of Alaska proposed lease areas but only gray, fin, and humpback whales have been observed in the Cook Inlet-Shelikof area. The seasonal occurrence of endangered whales and an indication of their relative abundance in the proposed lease areas in the Gulf of Alaska region are given in Table 1. None of these whales are known to mate or calve in the area considered herein. Therefore, this facet of their biology and life history will not be adversely affected by oil and gas development in the Gulf of Alaska.

Generally it is assumed that these whales feed only within their summer range. Their principal food items and methods of feeding are given in Table 2.

Proposed Activities

A. Leasing and Pre-exploration Stages.

Activities associated with the lease sales include offering the leases, submission of bids, and awarding of leases to the successful bidders. Pre-exploration activities may involve further geophysical exploration and a small increase in vessel traffic. No adverse impact to endangered whales is anticipated from these activities, as the whales probably would actively avoid the source of any annoyance, such as high energy acoustic exploration.

B. Exploration Stage

Site specific geophysical work may be required at exploratory well locations. Lessees must submit to USGS an exploration plan and obtain USGS approval before any exploratory drilling can take place. Generally the exploration plan will identify where and how the exploratory drilling will take place. The Director of the Alaska Region, National Marine Fisheries Service will have opportunity to review exploratory drilling permit applications and make such recommendations for protection of living marine resources as he deems necessary.

Estimated Exploration Activity Based on Mean Scenario - Sale 55 (Eastern Gulf of Alaska).

Exploration is expected to begin in 1981 and continue through 1985 with a total of 14 exploration and delineation wells drilled. No more than two rigs are assumed to be working during any year. Jack-up rigs could be used in shallow water and drillships and semi-submersibles could be used in deeper water.

Primary support/supply activities would be based at the existing Yakutat facility owned by Atlantic Richfield Company (ARCO) and some marine traffic would utilize the existing facilities at Seward. These facilities would be capable of handling all necessary marine support activities during the exploratory phase. Aircraft support would be conducted at the state-owned airport at Yakutat, and Cape Yakataga would be used as an auxiliary support area during bad weather.

Estimated Exploration Activity Based on Mean Scenario - Sale 46 (Kodiak).

As this sale apparently will be postponed until 1983, we assume that the timing of exploration activities will be advanced from 1981 and 1986 to 1984 and 1989 respectively. Exploration is expected to begin in 1984 and continue through 1989 with a total of 24 exploration and delineation wells drilled. No more than one rig is assumed to be working during any year. Jack-up rigs could be used in shallow water and drillships and semi-submersibles could be used in deeper water.

Primary maritime support and supply activities would occur from existing industry facilities located at Seward and possibly from a base that would be constructed in the Chiniak Bay area. Aircraft support would be conducted from airfields located at Seward, Kodiak City, and Cape Chiniak.

Estimated Exploration Activity Based on Mean Scenario - Sale 60 (Cook Inlet-Shelikof Strait).

No more than four rigs are assumed to be working during any year. Semi-submersibles could be used, each requiring 120,000 square feet of surface area.

Primary support/supply activities would be based in the Homer area. These facilities would be capable of handling all necessary marine support activities with no further expansion during the exploratory phase. Aircraft support is unknown at this time. Two or three support and supply vessels would be needed. Future facilities may be built near Kupreanof Straits. No offshore terminals are anticipated.

Potential Impacts on Whales

Human disturbances arising from exploration activities could affect whale behavior. Development elsewhere has indicated that vessel traffic or certain engine sound frequencies may alter whale behavior. Scammon Lagoon in Mexico has been closed to all but local fishing boat traffic because of disturbance to gray whales there. Changes in the manner humpback whales occupy Glacier Bay, Alaska, have been attributed, at least in part, to increased tour ship and small boat traffic. The National Park Service has published regulations governing the number of tour ships that may enter Glacier Bay and the speeds and the distances which all vessels must observe in the presence of humpback whales. Similar guidelines have been published for the Hawaiian humpback whale grounds. There also is concern over the effects of noise and human disturbance on bowhead whales in the Beaufort Sea. Studies currently are being conducted or planned to determine the effects of sound frequencies and vessel traffic on whale behavior. The NMFS will review the results of these studies and take the appropriate action to prevent jeopardy to any of the endangered whales.

A major adverse impact to endangered whales could result from an oil spill during exploration. Potential effects of oil pollution on endangered whales may include: (1) fouling of the feeding mechanism (i.e., baleen plates), (2) ingestion of oil with unknown effect on whale physiology, (3) the reduction of food supplies through contamination or alteration of their marine habitat, (4) irritation of skin and eyes, and (5) disruption of respiratory functions.

Major data gaps exist on the effects of oil pollution and associated OCS activities on marine mammals, especially cetaceans. For example, no comprehensive studies have been completed to determine either the effects of various sound frequencies emitted from oil and gas operations or related activities on the behavior of marine mammals, or to evaluate the impacts resulting from offshore structures and human activity on marine mammal populations, or to delineate the effect of petroleum products on marine mammals. Studies currently being conducted or funded by BLM address these problems and meaningful results should be available in two to four years. The NMFS will review these results and take the appropriate action to insure that OCS activities will not jeopardize the continued existence of any of the endangered whales.

Conclusion

Based upon our knowledge of the biology of these whales, the broad distribution of most of these endangered whales, the relatively small area involved in the lease sales, the very low probability of a major oil spill during exploration (no major spills have ever occurred from an exploratory well in U.S. waters), and the anticipated level of exploration activities (no more than four rigs working in one year in the Cook Inlet-Shelikof area; no more than two rigs working in one year in the eastern Gulf of Alaska, no more than one rig during any year in the Kodiak area; and a small increase in vessel and air traffic), NMFS concludes that the lease sale and exploration activities associated with Lease Sales 46, 55, and 60 are not likely to jeopardize the continued existence of any of the endangered whales or their habitats.

This biological opinion ends formal Section 7 Consultation for the lease sale and exploration activities associated with OCS Lease Sales 46, 55, and 60. However, consultation must be reinitiated if significant new information becomes available (habitat studies and reanalysis of available data are planned for this summer) or if the lease sale or exploration plans change significantly.

The level of development stage activity, if any, depends upon the results of exploration. Until the amount of recoverable hydrocarbon resources is estimated and the extent of production and development activities is determined, we cannot address the potential impacts on the endangered whales from such activities. Studies are now on-going or being proposed to enable us to better determine seasonal occurrence and habitat utilization patterns and the direct or indirect impacts of OCS development on endangered whales. These studies, however, are not scheduled to be completed for the next two-to-four years. We encourage studies such as those proposed in the biological assessment. Formal consultation under Section 7 of the Endangered Species Act should take place before development and production operations proceed in the eastern Gulf of Alaska, Cook Inlet-Shelikof, or Kodiak lease areas.

Sincerely yours,

for Winfred H Meibohm

Terry L. Leitzell
Assistant Administrator
for Fisheries

Enclosures

Table 1. Seasonal occurrence of endangered cetaceans in the Gulf of Alaska proposed lease areas.

	OCS Lease areas											
	46 - Kodiak				55 - EGOA/Yakutat				60 - Cook/Shelikof			
Species	W	Sp	Su	A	W	Sp	Su	A	W	Sp	Su	A
Gray whale	a	a	+	a	a	a	+	a		+		
Right whale	0	+	+	+	0	+	+	+	0			
Blue whale	0	+	+		0		+		0			
Fin whale	0	+	a	+	0	+	+	+	0	+	+	
Sei whale	0	+	+	+	0	+	+	+	0			
Sperm whale	0	+	+	+	0	0	+		0			
Humpback whale	0	+	a	+	0	+	a	+	0	+	+	+

Season

W - Winter, Dec. - Feb.

Sp - Spring, March - May.

Su - Summer, June - Aug.

A - Autumn (fall), Sept. - Nov.

a = abundant

0 = essentially absent

+ = present but limited data

blank = unknown

Table 2. Principal food items and feeding method of endangered whales in the Gulf of Alaska

Species	Principal food items	Feeding method
Blue	euphausiids	engulfment
Fin	euphausiids, herring, capelin	engulfment
Humpback	euphausiids, herring, capelin	engulfment
Sei	Copepods, herring, capelin	skimming
Gray	benthic amphipods, polychaetes	Bottom feeder - engulfment
Right	Plankton	skimming
Sperm	squid, fish	unknown, may feed off bottom

APPENDIX I

BLM/OCS ENVIRONMENTAL STUDIES PUBLICATIONS

The following reports are published by the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Outer Continental Shelf Environmental Assessment Program (OCSEAP).

Name	Date	Title
Ainley, D. G. and C. R. Grau	1978	Influence of Petroleum on Eggs Formation and Embryonic Development in Seabirds. (RU 423).
Arneson, P.	1979	Identification, Documentation, and Delineation of Coastal Migratory Bird Habitat in Alaska. (RU 03).
Atlas, R.	1977	Microbial Communities in the Lower Cook Inlet, Alaska. (RU 30).
Atlas, R.	1979	Assessment of Potential Interactions of Microorganisms and Petroleum Pollutants in Alaskan Outer Continental Shelf Areas. (RU 29).
Barrick, D.	1979	HF Surface-Current Mapping Radar, 1977 Alaskan Operations-Lower Cook Inlet. (RU 48).
Blackburn, J. and P. Jackson	1979	Seasonal Composition and Food Web Relationships of Marine Organisms in the Nearshore Waters of Lower Cook Inlet - Including Fishes and Benthic Epifauna. (RU 514).
Bouma, A. and M. Hampton	1979	Shallow Faulting, Bottom Instability, and Movement of Sediments in Lower Cook Inlet and Western Gulf of Alaska. (RU 327).
Burrell, D.	1979	Distribution and Dynamics of Heavy Metals in Alaskan Shelf Environments Subject to Oil Development. (RU 162).
Cacchione, D. and D. Drake	1979	Bottom and Near-Bottom Sediment Dynamics in Lower Cook Inlet. (RU 430).
Cline, J. and K. Feely	1979	Characterization and Source Identification of Anthropogenic and Natural Low Molecular Weight Petroleum Hydrocarbons in Cook Inlet and Norton Sound, Alaska. (RU 153).
English, T. S.	1979	Lower Cook Meroplankton. (RU 424).
Fay, F.	1977	Morbidity and Mortality of Marine Mammals. (RU 194).
Feder, H.	1978	Distribution, Abundance, Community Structure, and Trophic Relationships of the Nearshore Benthos of the Kodiak Shelf, Cook Inlet, and Northeast Gulf of Alaska. (RU 05)

RU = Research Unit

Feely, R. and J. Cline	1979	Composition, Transport, and Deposition of Suspended Matter in Lower Cook Inlet and Norton Sound, Alaska. (RU 152).
Flagg, L. and R. Rosenthal	1976	An Ecological Assessment of the Littoral Zone Along the Outer Coast of the Kenai Peninsula. (RU 27).
Galt, J.	1979	Alaska Numerical Modeling. (RU 140).
Griffith, R. and R. Morita	1979	Study of Microbial Activity and Crude Oil - Microbial Interactions in Water and Sediment of Cook Inlet, Norton Sound, and the Beaufort Sea. (RU 190).
Hayes, M.	1979	Oilspill Vulnerability, Coastal Morphology, and Kodiak Archipelago. (RU 59).
Hoskins, C.	1978	Grain-Size Analysis and Data Reduction of Bering Sea Bottom Sediments. (RU 291).
Hoskins, C.	1978	Grain-Size Analysis of Sediment from Alaskan Continental Shelves. (RU 290).
Kaiser, R.	1977	Razor Clam Distribution and Population Dynamics. (RU 24).
Kaplan, I. R. and N. E. Reed	1977	Characterization of Organic Matter in Sediments from the Gulf of Alaska, Bering and Beaufort Seas. (RU 480).
Kaplan, I. R. and M. I. Venkatesan	1980	Characterization of Organic Matter in Sediments from Cook Inlet and Norton Sound. (RU 480).
Karinen, J., S. Rice, and S. Korn	1979	Vulnerability of Pink Salmon Eggs and Alevins Exposed to Oil in a Simulated Spawning. Environment. (RU 72).
Kienle, J. and H. Pulpan	1979	Seismic and Volcanic Risk Studies - Western Gulf of Alaska. (RU 251).
Kooyman, G. L. and W. A. Garey	1978	Effects of Oiling on Temperature Regulation in Sea Otters.
Kooyman, G. L. and W. A. Garey	1979	Effects of Oiling on Sea Otters in Nature. (RU 71).
Larrance, J. and A. Chester	1980	Composition and Source of Organic Detritus in Lower Cook Inlet. (RU 425). (Final Report).

RU = Research Unit

Lees, D.	1979	Ecological Studies of Intertidal and Shallow Subtidal Habitats in Lower Cook Inlet and the NEGOA Region. (RU 417).
Lensink, C.	1979	Seasonal Distribution and Abundance of Marine Birds. (RU 337).
Lensink, C., G. Sanger, and P. Gould	1979	Population Dynamics and Trophic Relationships of Marine Birds in the Gulf of Alaska. (RU 341).
Malins, D., H. Hodgins, N. Karrack, and D. Weber	1979	Sublethal Effects on Petroleum, Including Biotransformations, as Reflected by Morphology, Chemical, Physiology, Pathology, and Behavioral Indices. (RU 73).
Muench, R. and H. Jofjeld	1978	Oceanographic Conditions in Lower Cook Inlet; Spring and Summer 1973. (RU 307).
O'Clair, C. and S. Zimmerman	1980	Intertidal Biota and Subtidal Kelp Communities of the Kodiak Island Area. (Final Report). (RU 78).
Pitcher, K. and D. Calkins	1979	Biology of the Harbor Seal - Phoca Vitulina Richardi in the Gulf of Alaska. (RU 229).
Pitcher, K. and D. Calkins	1979	Population Assessment, Ecology, and Trophic Relationships of Stellar Sea Lions in the Gulf of Alaska. (RU 243).
Polcyn, F.	1978	Intertidal Algal Analysis. (RU 428).
Reynolds, M.	1978	Nearshore Meteorology. (RU 367).
Rice, S., J. Karinen, and S. Korn	1978	Lethal and Sublethal Effects on Selected Alaskan Marine Species After Acute and Long-Term Exposure to Oil and Oil Components. (RU 72).
Robertson, D. and K. Abel	1978	Trace Metal Baseline Studies at the Aleutian, Kodiak, and St. George Basin Outer Continental Shelf (OCS) Sites. (RU 506).
Royer, T.	1979	Circulation and Water Masses in the Gulf of Alaska. (RU 289).
Schleuter, R.	1979	Oilspill Trajectory Analysis, Lower Cook Inlet, Alaska. (RU 436).

RU = Research Unit

Schneider, K.	1976	Assessment of the Distribution and Abundance of Sea Otters Along the Kenai Peninsula, Kamishak Bay, and the Kodiak Archipelago. (RU 240).
Schumacher, J., S. Hayes, R. Charnell, R. Munch, and R. K. Rord	1979	Northwest Gulf of Alaska Oceanographic Processes. (RU 138).
Shaw, D. G.	1979	Hydrocarbons: Natural Distribution and Dynamics on the Alaskan Outer Continental Shelf. (RU 275).
Warner, J. S.	1978	Activity-Directed Fractionation of Petroleum Samples. (RU 500).
Whipple, J.	1978	Transport, Retention, and Effect of Water-Soluble Fraction of Cook Inlet Crude Oil in Experimental Food Chains. (RU 389).
Wise, J.	1977	Marine Climatology of the Gulf of Alaska, the Bering, and Beaufort Seas. (RU 347).

RU = Research Unit

APPENDIX J

A COMPENDIUM OF THE SIZE, DISTANCE FROM SHORE, AND WATER DEPTH OF BLOCKS WHICH COMPRISE THE PROPOSED ACTION AND ALTERNATIVES TO THE PROPOSED ACTION

	Block	Hectares	Acres	Water Depth (Meters)	Distance from shore (Statute Miles)
No. 5-1	484	2304.00	5693.18	37	7
#*	527	2304.00	5693.18	35	8
	615	2304.00	5693.18	40	8
	659	2304.00	5693.18	45	8
	703	2304.00	5693.18	50	8
#*	748	2304.00	5693.18	60	11
#*	836	2304.00	5693.18	75	14
#*	880	2304.00	5693.18	40	10
#*	923	2304.00	5693.18	95	15
#*	924	2304.00	5693.18	120	17
#*	968	2304.00	5693.18	132	15
#*	1011	2304.00	5693.18	125	11
#*	1012	2304.00	5693.18	143	13
#*	1055	2304.00	5693.18	143	9
#*	1056	2304.00	5693.18	150	11
No. 5-2	93	1037.00	2562.42	15	4
	94	2304.00	5693.18	25	6
	137	2028.00	5011.18	25	5
	138	2304.00	5693.18	37	7
	181	2304.00	5693.18	28	7
	182	2304.00	5693.18	40	9
	186	2304.00	5693.18	48	11
	224	2304.00	5693.18	27	8
	225	2304.00	5693.18	27	10
	226	2304.00	5693.18	35	11
	228	2304.00	5693.18	76	15
	229	2304.00	5693.18	60	14
	230	2304.00	5693.18	40	11
	268	2304.00	5693.18	35	11
	269	2304.00	5693.18	32	14
	270	2304.00	5693.18	50	17
	271	2304.00	5693.18	76	15
	272	2304.00	5693.18	70	17
	273	2304.00	5693.18	53	15
#*	312	2304.00	5693.18	39	12
#*	313	2304.00	5693.18	39	15
#*	314	2304.00	5693.18	70	16
#*	315	2304.00	5693.18	76	18
#*	316	2304.00	5693.18	60	18
#*	317	2304.00	5693.18	46	15
#*	359	2304.00	5693.18	70	20
#*	360	2304.00	5693.18	55	18
#*	361	2304.00	5693.18	45	16
#*	404	2304.00	5693.18	54	20
#*	405	2304.00	5693.18	50	18
#*	487	2304.00	5693.18	55	15
#*	533	2304.00	5693.18	57	22
#*	580	2304.00	5693.18	70	16

Appendix J
(continued)

No. 5-2	Block	Hectares	Acres	Water Depth (Meters)	Distance from shore (Statute Miles)
#*	621	2304.00	5693.18	62	23
#*	625	2304.00	5693.18	80	12
#*	661	2304.00	5693.18	58	14
#*	662	2304.00	5693.18	73	17
#*	663	2304.00	5693.18	70	20
#*	664	2304.00	5693.18	63	23
#*	665	2304.00	5693.18	65	23
#*	666	2304.00	5693.18	65	20
#*	669	2304.00	5693.18	80	11
#*	705	2304.00	5693.18	65	14
#*	706	2304.00	5693.18	80	17
#*	707	2304.00	5693.18	80	20
#*	713	2304.00	5693.18	80	11
#*	751	2304.00	5693.18	100	21
#*	756	2304.00	5693.18	96	14
#*	757	2304.00	5693.18	95	11
#*	793	2304.00	5693.18	95	17
#*	795	2304.00	5693.18	120	22
#*	800	2304.00	5693.18	100	14
#*	837	2304.00	5693.18	120	19
#*	838	2304.00	5693.18	133	21
#*	881	2304.00	5693.18	138	19
#*	882	2304.00	5693.18	140	22
#*	925	2304.00	5693.18	143	17
No 5-3*	43	2304.00	5693.18	165	7
*	44	2304.00	5693.18	165	10
*	88	2304.00	5693.18	168	8
	131	1958.00	4838.21	174	5
*	132	2304.00	5693.18	159	7
*	176	2304.00	5693.18	155	8
&	219	2304.00	5693.18	179	6
&	220	2304.00	5693.18	146	9
&	263	2292.00	5663.53	168	8
&	264	2304.00	5693.18	146	10
&	306	2028.00	5011.18	155	8
&	307	2304.00	5693.18	159	10
&	308	2304.00	5693.18	155	13
&	350	2304.00	5693.18	161	9
&	351	2304.00	5693.18	168	12
&	352	2304.00	5693.18	161	14
&	394	2304.00	5693.18	168	11
&	395	2304.00	5693.18	165	13
&	396	2304.00	5693.18	159	16
&	438	2304.00	5693.18	168	13
&	439	2304.00	5693.18	161	14
&	479	2304.00	5693.18	134	8

Appendix J
(continued)

No. 5-3	Blocks	Hectares	Acres	Water Depth (Meters)	Distance from shore (Statute Miles)
&	480	2304.00	5693.18	165	11
&	481	2304.00	5693.18	174	13
&	482	2304.00	5693.18	168	14
&	483	2304.00	5693.18	163	12
&	522	2304.00	5693.18	146	10
&	523	2304.00	5693.18	146	12
&	524	2304.00	5693.18	179	13
&	525	2304.00	5693.18	176	15
&	526	2304.00	5693.18	174	13
&	565	2304.00	5693.18	119	12
&	566	2304.00	5693.18	137	13
&	567	2304.00	5693.18	146	14
&	568	2304.00	5693.18	183	15
&	569	2304.00	5693.18	176	13
&	570	2304.00	5693.18	176	11
&	607	2304.00	5693.18	192	7
&	608	2304.00	5693.18	174	10
&	609	2304.00	5693.18	165	13
&	610	2304.00	5693.18	174	16
&	611	2304.00	5693.18	183	16
&	612	2304.00	5693.18	179	13
&	613	2304.00	5693.18	179	11
&	651	2304.00	5693.18	192	8
&	652	2304.00	5693.18	177	11
&	653	2304.00	5693.18	177	14
&	654	2304.00	5693.18	177	16
&	655	2304.00	5693.18	177	14
&	656	2304.00	5693.18	177	12
&	695	2304.00	5693.18	192	9
&	696	2304.00	5693.18	177	12
&	697	2304.00	5693.18	177	14
&	698	2304.00	5693.18	177	14
&	699	2304.00	5693.18	177	12
&	737	0.00	0.00	---	---
&	738	2304.00	5693.18	210	9
&	739	2304.00	5693.18	192	11
&	740	2304.00	5693.18	179	13
&	741	2304.00	5693.18	177	14
&	742	2304.00	5693.18	177	12
&	781	2304.00	5693.18	219	7
&	782	2304.00	5693.18	201	10
&	783	2304.00	5693.18	192	12
&	784	2304.00	5693.18	187	15
&	785	2304.00	5693.18	179	12
&	825	2304.00	5693.18	210	8

Appendix J
(continued)

No. 5-3	Blocks	Hectares	Acres	Water Depth (Meters)	Distance from shore (Statute Miles)
&	826	2304.00	5693.18	199	11
&	827	2304.00	5693.18	196	14
No. 5-4					
*	48	2304.00	5693.18	170	13
*	90	2304.00	5693.18	159	14
*	91	2304.00	5693.18	174	16
*	92	2304.00	5693.18	187	13
*	133	2304.00	5693.18	150	11
*	134	2304.00	5693.18	155	14
*	135	2304.00	5693.18	168	16
*	177	2304.00	5693.18	146	12
*	178	2304.00	5693.18	155	14
	221	2304.00	5693.18	146	13
	265	2304.00	5693.18	146	14
	309	2304.00	5693.18	150	12

* Denotes blocks incorporated as Alternative IV.

# Denotes blocks incorporated as Alternative V.

& Denotes blocks incorporated as Alternative VI.

APPENDIX K

WEIGHTS AND MEASURES

WEIGHTS AND MEASURES

All units of weights and measures are metric unless otherwise stated. The following is a conversion table from the metric system to the English system:

Metric		English
LENGTH		
1 millimeter (mm) [0.1 centimeter (cm)]	=	0.0394 inch (in.)
1 cm [10 mm]	=	0.3937 in.
1 meter (m) [100 cm]	=	39.37 in.
	=	1.09 yard (yd)
	=	3.28 feet (ft)
1 kilometer (km) [1000 m]	=	0.621 mile (mi)
1 nautical mile [1852 m]	=	6076.1 ft
	=	1 minute of latitude (approx.)
AREA		
1 square centimeter (cm^{2})	=	0.155 square inch (in.^{2})
1 square meter (m^{2})	=	10.76 square feet (ft^{2})
	=	1.196 square yards (yd^{2})
1 hectare (ha)	=	2.4710 acres (a)
1 square kilometer (km^{2})	=	0.386 square mile (mi^{2})
VOLUME		
1 cubic centimeter (cm^{3})	=	0.0610 cubic inch (in.^{3})
1 cubic meter (m^{3})	=	35.314 cubic feet (ft^{3})
	=	1.31 cubic yards (yd^{3})
1 liter	=	1.06 quarts (qt)
	=	0.264 gallon (gal)
159.18 liters	=	1 barrel of oil (42 gal)

MASS

1 kilogram (kg) [1000 grams (g)] = 2.20 pounds (lb)
= 0.0011 ton

1 metric ton (MT) [1000 kg] = 1.10 ton
= 0.9842 long ton (LT)

136.2 kilograms = 1 barrel of oil (300 lbs)

APPENDIX L

USGS MEMORANDUM

GEOLOGIC HAZARDS TO HYDROCARBON EXPLORATION AND PRODUCTION IN LOWER COOK INLET AND SHELIKOF STRAIT

Conservation Division
Alaska Region
800 A Street, Suite 201
Anchorage, Alaska 99501

NOV 25 1980

Memorandum

To: Conservation Manager--Alaska Region
Chief, Branch of Pacific-Arctic Marine Geology

Through: Deputy Conservation Manager--Offshore Resource Evaluation
Supervisor, Geologic Hazards Unit

From: Peter Hoose, Geophysicist
Glenn Thrasher, Geophysicist
Bruce Turner, Geologist
Monty Hampton, Geologist

Subject: Joint Conservation Division and Geologic Division meeting concerning geologic hazards to hydrocarbon exploration and production in Lower Cook Inlet and Shelikof Strait, proposed Oil and Gas Lease Sale 60.

On November 18 and 19, 1980, the authors met to review and evaluate the surface and near-surface geology of the proposed Oil and Gas Lease Sale 60 area. The purpose of this meeting was to assure mutual agreement on the identity of potential geologic hazards which might affect future oil and gas exploration and development. This memorandum summarizes the data used for tract analysis, the geologic setting of the area, and the potential hazards existing within the sale area.

Data Sources

Portions of the area proposed for Oil and Gas Lease Sale 60 are in Lower Cook Inlet. This section of Lower Cook Inlet was offered in a previous lease sale, Sale CI. The environmental geologic analysis for Sale CI identified no geologic hazards that would merit tract withdrawal or stipulation. Certain bottom conditions did merit a cautionary note. These conditions were (a) bedform features, (b) tectonic features, and (c) steep slopes.

As additional data from Lower Cook Inlet have become available, the analysis of hazards has been updated and refined. The sources of data incorporated into the analysis were:

1. BBN Proprietary Survey, 1973
2. Aquatronics Proprietary Survey, 1974
3. Geophysical Corporation of Alaska Proprietary Survey, 1976
4. Petty-Ray -- USGS Public Survey, 1976
5. USGS R/V SEA SOUNDER Public Surveys 1976, 77, 78
6. Site specific high resolution data from leases within Sale CI.

The geologic hazards evaluation of the Shelikof Strait portion of the Sale 60 area (south of Cape Douglas) was accomplished by mapping the regional environmental geology of the strait and then concentrating on the blocks proposed for inclusion in the sale. This analysis utilized the following public data sets:

1. Nekton, Inc., USGS contract, 1979
2. USGS, R/V S.P. LEE, 1976 and 1980
3. USGS, R/V DISCOVERER, 1980

The following table summarizes the surveys, their length, and the types of data collected.

Survey	Line Kilometers	Data
BBN Proprietary 1973	5475	Sparker, Acoustipulse 3.5 kHz, side scan sonar
Aquatronics Proprietary 1974	1167	Sparker
Geophysical Corp. of Alaska Proprietary, 1976	3280	Multichannel Sparker, Minisparker
Petty-Ray (USGS) 1976	4231	Sparker, 3.5 kHz, side scan sonar
R/V SEA SOUNDER (USGS) 1976, 77, 78, 79	5072	Sparker, minisparker, Uniboom, 12 kHz, 3.5 kHz side scan sonar, bottom samples
Nekton (USGS) 1979	2557	Multichannel sparker, Uniboom, minisparker, 3.5 kHz, fathometer, side scan sonar

R/V S.P. LEE (USGS) 1976, 80		Airgun, Uniboom, 3.5 kHz 12 kHz, bottom samples
R/V DISCOVERER (USGS) 1980	980	Airgun, minisparker, 3.5 kHz, 12 kHz, bottom samples

Geologic Setting

The tracts scheduled to be offered in Oil and Gas Lease Sale 60 are located within the northeast trending structural trough of Cook Inlet and Shelikof Strait. The sale area is underlain by folded and faulted Mesozoic and Tertiary strata which are blanketed by relatively undeformed Quaternary sediments. The deformation of the Mesozoic and Tertiary strata is a result of compression due to the northwestward underthrusting of oceanic lithosphere beneath the region. The high seismicity of the region results from this subduction of the Pacific Plate beneath the North American Plate.

Along the western side of the proposed sale area, a line of volcanic centers lies parallel to the northeast structural trend. These volcanic centers are another expression of the underthrusting of oceanic lithosphere beneath southern Alaska. Due to the andesitic nature of this volcanism, eruptions tend to be explosive.

Cook Inlet has experienced at least five major Pleistocene glaciations (Karlstrom, 1964). Each of these glacial events at least partially filled the Cook Inlet trough. As a result of these glaciations, the seafloor of Cook Inlet is underlain by up to 150 meters of glacial deposits.

The surficial sediment in Lower Cook Inlet is predominantly a sand and gravel lag deposit. This is a consequence of the vigorous tidal currents that rework glacial sediment. In general, sediment texture becomes finer from north to south. In the central portion of Lower Cook Inlet, bottom currents have molded the surficial sediment into a field of large sand waves and smaller ripple marks.

Surficial sediment in Shelikof Strait is generally finer than that of Lower Cook Inlet. Sand in the northeastern end of the strait grades into fine sand and mud in the southwestern end. The bedforms present in Lower Cook Inlet are absent in Shelikof Strait. The part of Shelikof Strait proposed for Sale 60 appears to be a depositional, rather than erosional, sedimentary environment.

Discussion of Potential Geologic Hazards

Seismicity:

Lower Cook Inlet and Shelikof Strait are located in a tectonically active region. This tectonism is associated with convergence of the Pacific and North American plates along the Aleutian Subduction Zone. As a consequence of this dynamic setting, the region has a high level of seismicity. In the past 65 years, 13 earthquakes of magnitude 6 or greater have occurred in the vicinity of Lower Cook Inlet (Magoon et al, 1975). Earthquakes of this size are capable of causing major structural damage either directly by ground shaking, fault displacement and surface warping, or indirectly by tsunamis, ground failures and consolidation of sediments. The level of seismic hazard is considered uniformly high throughout the sale area. A tract-specific analysis is not considered meaningful with the present data or analytical techniques.

Tsunamis which are generated by coastal or submarine earthquakes have been unpredictable in their occurrance. The major impact of a tsunami would be along the shoreline and in shoal areas. There are no proposed lease tracts which fall into either of these categories.

Faulting:

Five distinct, mappable fault scarps that displace surface sediment occur within or adjacent to the proposed sale area. Displacement of surface sediment may be an indication of recent movement, but not necessarily continuing activity. Although fault scarps themselves should be avoided in siting seafloor installations, the hazards from ground shaking in their vicinity will vary greatly with the specific site characteristics such as state of consolidation, thickness of overburden, grain size, water content, and slope of bottom. Attachment A lists all tracts having faults with surface expression in the sale area. The purpose in identifying these tracts is to insure that potential lessees are aware that conditions surrounding the fault will be carefully reviewed when site specific data becomes available prior to drilling.

Sediment Mass Movement:

Because the entire area is covered by unconsolidated sediment, the potential for mass movement in areas of sloping bottom must be considered. However, based on review of all the data at hand, there is no evidence of massive slumps, liquefaction, or debris flow within the proposed sale area. Only one definite case of slope failure, associated with faulting, was found near the sale area in Shelikof Strait. This is a relatively small feature but does serve to point out that a hazard may exist in areas of sloping bottom especially along fault scarps.

Shallow Gas:

No gas seeps were observed, although the presence of possible shallow gas is implied on the seismic reflection records by the occurrence of bright spots, terminated reflectors, and acoustically attenuated reflectors. Some or all of these conditions were recognized over broad areas of Shelikof Strait and in a few localized areas of Lower Cook Inlet. Hydrocarbon analyses however, showed extremely low levels of gas in sediment samples taken in the sale area. The authors conclude that the presence of shallow gas is not sufficient to limit the exploration or development of any tract in the proposed sale area. Because the acoustic anomalies are generally mappable features, avoidance or caution should be exercised when drilling in the proximity of such features. The depth below mudline at which the acoustic anomalies occur is between 30 to 60 milliseconds (25 to 50 meters). Tracts in which these anomalies occur are listed in Attachment B.

Bedforms and anomalous bottom features:

Several sizes of sand waves and ripple marks, forming fields or occurring as isolated features, cover an extensive area of Lower Cook Inlet. These features range in wavelength from a few meters to as much as 350 meters. Wave heights range up to as much as 10 meters. Smaller ripple marks commonly occur astride the larger waves. Comparison of coincident track lines shot in 1973 and 1976, reveals that over that time period, the large sand waves were stable (Whitney et al, 1979). The relatively short time frame of this study does not rule out the possibility that these features are mobile but at an undetected slow rate. Prospective developers of this area should be cautioned about this possibility, because bedform migration could cause removal of support or excess loading on bottom-founded installations.

In Shelikof Strait numerous near circular, crater-like features occur in the seismic reflection data. These features are typically 60 m in diameter, and 2 to 5 meters deep. Origin of these is unknown at this time, but two possibilities considered are (1) liquefaction of sediment during a seismic event and subsequent formation of mud or sand volcanoes or (2) expulsion of biogenic gas in bubble phase from within the sediment. Although neither of these explanations are considered entirely satisfactory, the features are very localized and are seen to present no obstruction to exploration or development. Tracts which contain crater-like features are listed in Attachment C.

Volcanic Hazards:

Five active volcanoes are located along or near the western shore of the proposed sale area. From north to south they are: Redoubt Volcano, Iliamna Volcano, Augustine Island, Mount Douglas and Mount Katmai. All but Mount Douglas have erupted in historic time and all five can be considered likely to erupt in the future. The composition of these volcanoes is andesitic and hence their eruptions will tend to be violent. In addition, the following volcanoes were reported to steam with varying intensities during 1953 and 1954: Kukak, Knife, Trident, and Mageik (Keller and Reiser, 1959). Some of the potential hazards that can be associated with these volcanoes are ash falls, ejecta, noxious gases, corrosive vapors, lightening discharges, nuee ardantes, and tsunamis. Except for the tsunamis and ash falls, these phenomena will be generally localized near the volcano and will not impact the lease blocks.

Summary

Having considered all the aforementioned data, the authors are in agreement that no tracts within the proposed sale area are sufficiently impacted by geologic hazards to prevent safe exploration and development for hydrocarbons.

Peter Hoose
Peter J. Hoose

Glenn P. Thrasher
Glenn P. Thrasher

Bruce W. Turner
Bruce W. Turner

Monty Hampton

References

Karlstrom, T., 1964, Quaternary Geology of the Kenai Lowland and Glacial History of the Cook Inlet Region, Alaska: U.S. Geological Survey Professional Paper 443.

Keller, A. S., Reiser, H. N., 1959, Geology of the Mount Katmai Area, Alaska: Geological Survey Bulletin 1058-G.

Magoon, L., Hampton, M., Sable, E., Smith, R., Chemelik, F., 1975, Hydrocarbon Potential, Geologic Hazards, and the Technology, Time-Frame and Infrastructure for Exploration and Development of the Lower Cook Inlet, Alaska: Open-File Report 75-549.

Whitney, J. W., Noonan, W. G., Thurston, D., Bouma, A. H., Hampton, M. A., 1979, Lower Cook Inlet Alaska: Do Those Large Sand Waves Migrate?: Offshore Technology Conference Proceedings.

Attachment A

Tracts with Faulting

BLM Protraction Diagram	Tract	Location
5-4	221	SW 1/4
	265	NW 1/4
5-3	263	SE 1/4
	264	NW, SE 1/4
	308	NW, NE 1/4
	523	SE 1/4
	566	SE 1/4
	567	NE, SE, SW 1/4
	568	NW 1/4
	608	NW 1/4
	611	SW 1/4
	653	SE, NE 1/4
	654	NW, SW, NE 1/4
	655	NW 1/4
	697	NE 1/4
	784	SW 1/4
	827	NE 1/4

Attachment B

Tracts With Gas Indicators

BLM Protaction Diagram	Tract	Location
5-4	90	NW, SW 1/4
	133	NE, SE, SW 1/4
	134	whole block
	135	SW, NW 1/4
	177	NW, NE 1/4
	178	whole block
	265	SE 1/4
	309	NE, SE, SW 1/4
5-3	176	SE 1/4
	220	NE 1/4
	306	SE 1/4
	307	SE 1/4
	308	SW, SE 1/4
	350	SE 1/4
	351	SE, NE, SW 1/4
	352	whole block
	394	NE 1/4
	395	NE, SE, NW 1/4
	396	whole block
	439	NE, SE 1/4
	480	SW 1/4
	483	NE 1/4

Attachment C

Tracts With Crater-like Features

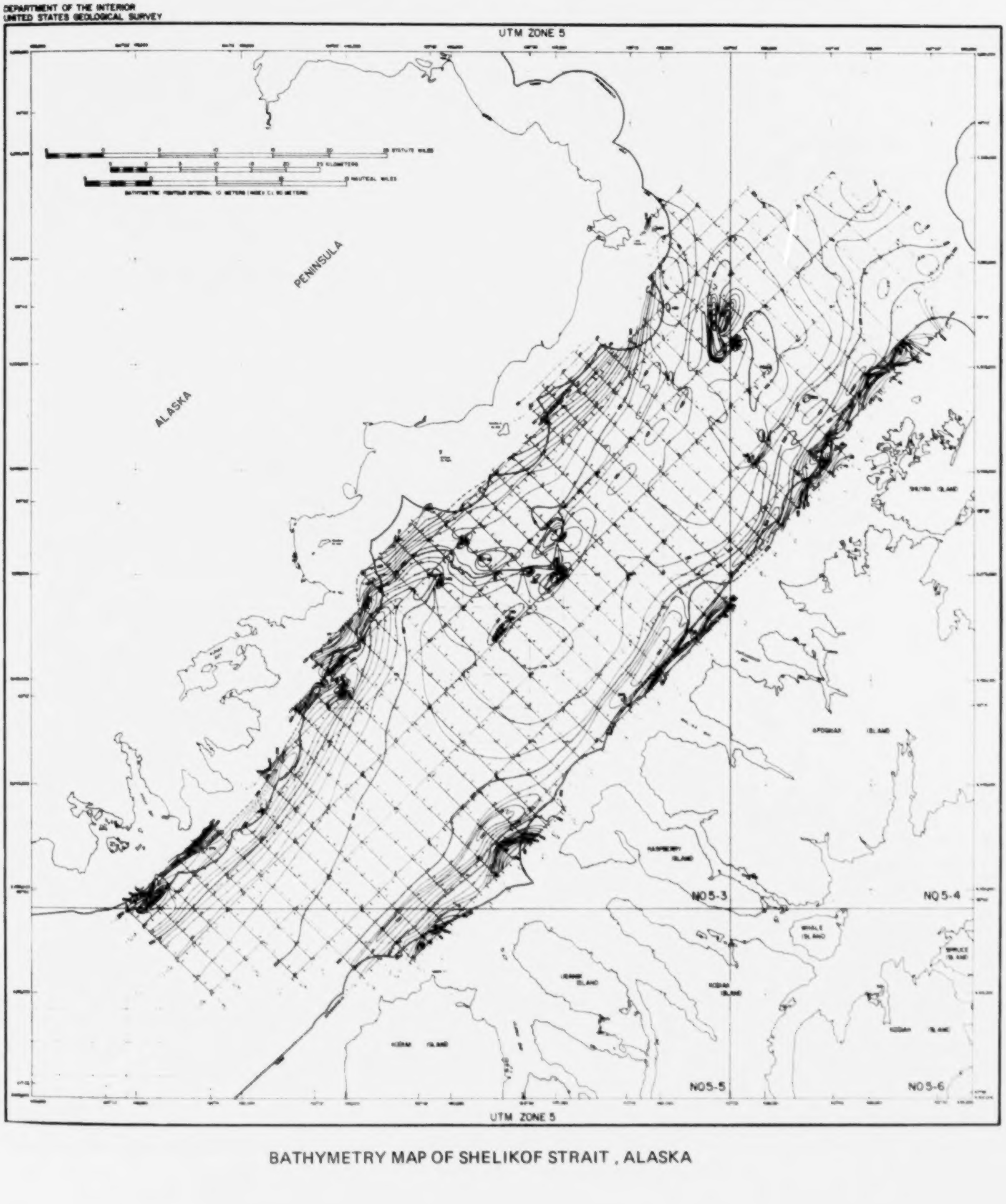
BLM Protraction Diagram	Tract
5-3	784
	785
	826

APPENDIX M

ENVIRONMENTAL GEOLOGY MAPS
SHELIKOF STRAIT

USGS OPEN-FILE REPORT 80-2036

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY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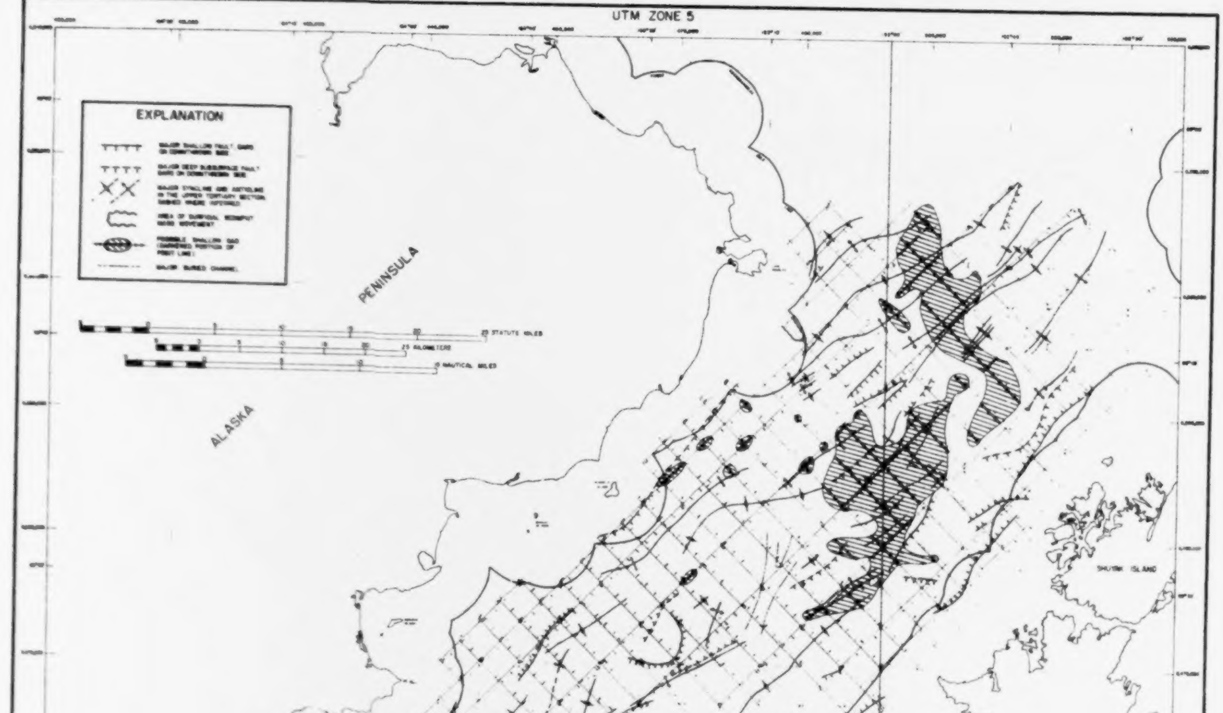
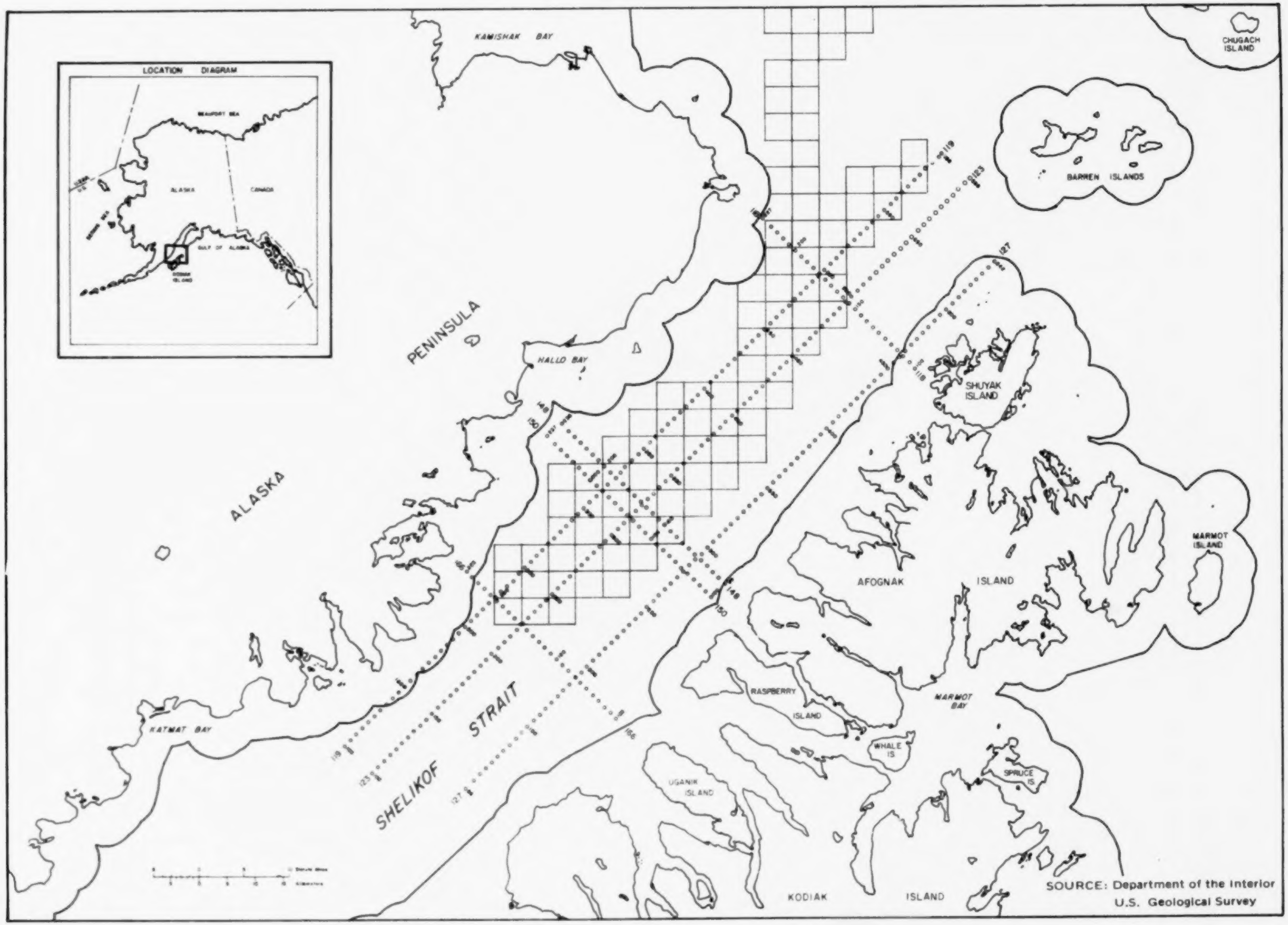
STATUTE MILES
KILOMETERS
NAUTICAL MILES
PENINSULA
ALASKA
SHUYAK ISLAND
AFOGNAK ISLAND
RASPBERRY ISLAND
WHALE ISLAND
SPRUCE ISLAND
KODIAK ISLAND
NO5-3
NO5-4
NO5-5
NO5-6
UTM ZONE 5

BATHYMETRY MAP OF SHELIKOF STRAIT , ALASKA

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY


UTM ZONE 5
EXPLANATION
MAJOR SHALLOW FAULT, BARB ON DOWNTHROWN SIDE
MAJOR DEEP SUBSURFACE FAULT, BARB ON DOWNTHROWN SIDE
MAJOR SYNCLINE AND ANTICLINE IN THE UPPER TERTIARY SECTION, DASHED WHERE INFERRED
AREA OF SURFICIAL SEDIMENT MASS MOVEMENT
POSSIBLE SHALLOW GAS (DARKENED PORTION OF TRACK LINE)
MAJOR BURIED CHANNEL
20 STATUTE MILES
25 KILOMETERS
15 NAUTICAL MILES
PENINSULA
ALASKA
SHUYAK ISLAND
AFOGNAK ISLAND
RASPBERRY ISLAND
WHALE ISLAND
SPRUCE ISLAND
UGANIK ISLAND
KODIAK ISLAND
KODIAK ISLAND
KODIAK ISLAND
NO 5-3
NO 5-4
NO 5-5
NO 5-6
UTM ZONE 5

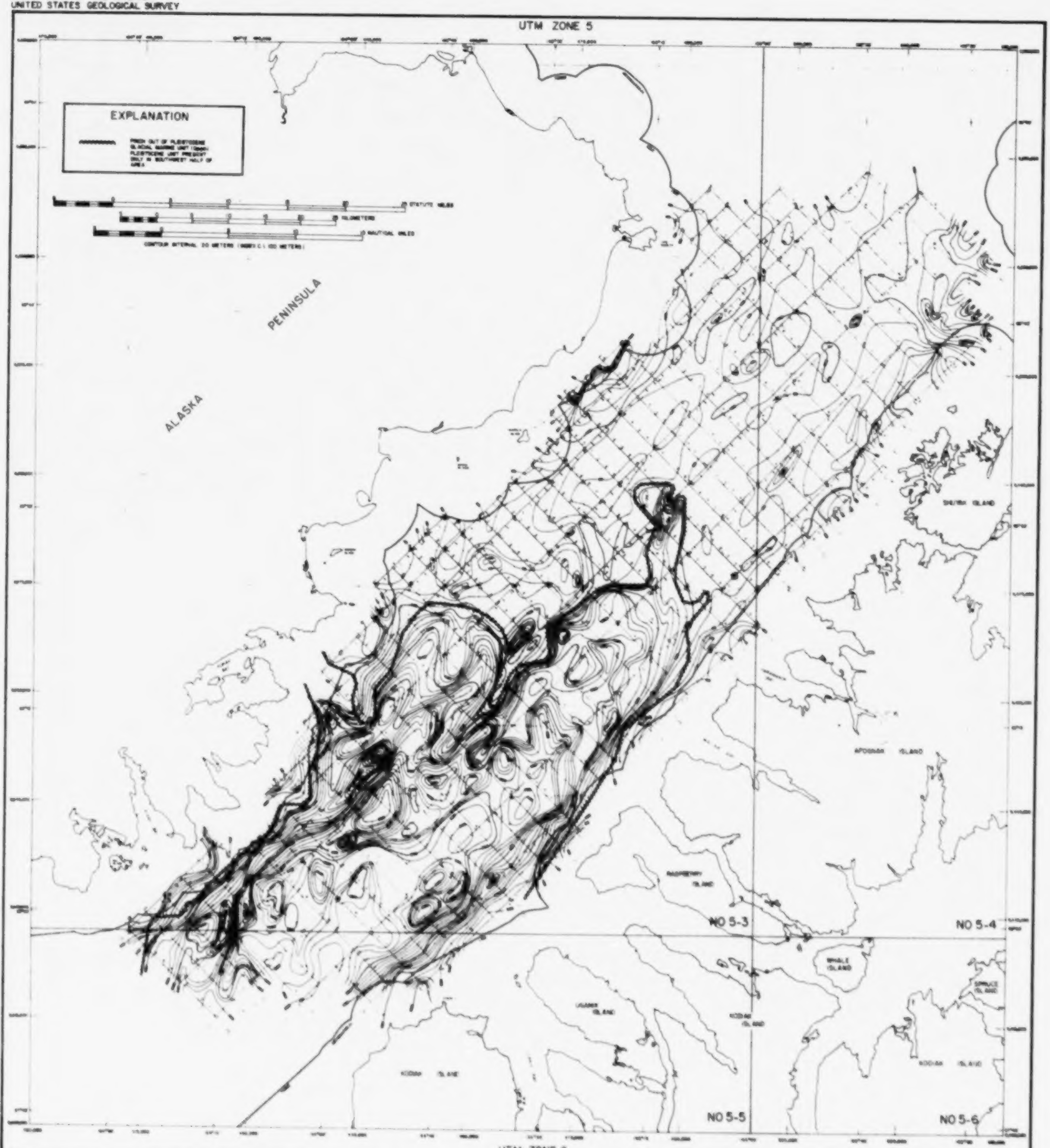
GEOLOGIC FEATURES OF SHELIKOF STRAIT, ALASKA


LOCATION DIAGRAM
BEAUFORT SEA
ALASKA
CANADA
GULF OF ALASKA
KODIAK ISLAND
KAMISHAK BAY
CHUGACH ISLAND
BARREN ISLANDS
PENINSULA
HALLO BAY
ALASKA
SHUYAK ISLAND
AFOGNAK ISLAND
MARMOT ISLAND
MARMOT BAY
RASPBERRY ISLAND
WHALE IS
SPRUCE IS
UGANIK ISLAND
KODIAK ISLAND
KATMAI BAY
SHELIKOF STRAIT
119
123
127
148
150
166
Statute Miles
Kilometers

SOURCE: Department of the Interior
U.S. Geological Survey

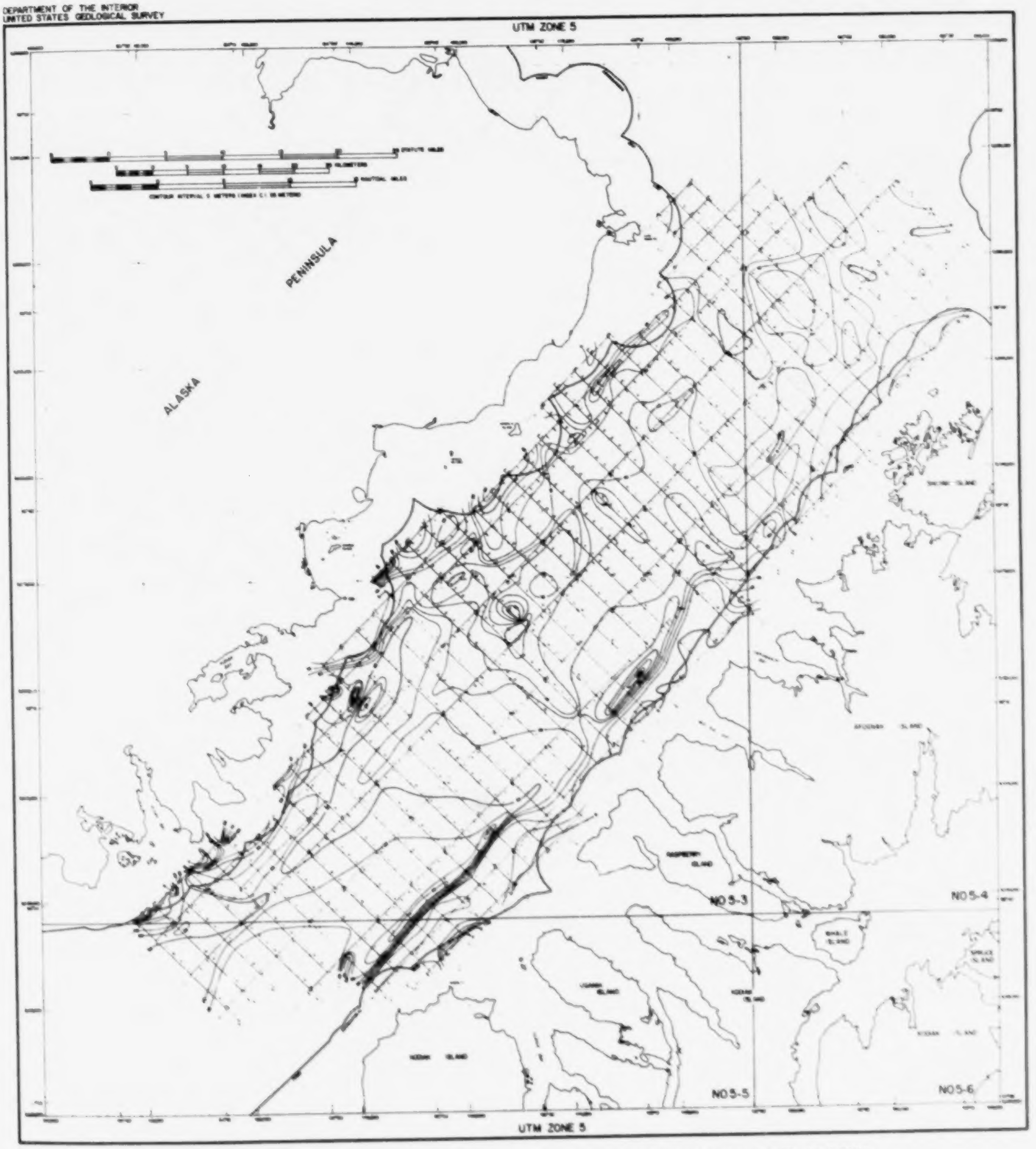
GEOLOGIC HAZARD SURVEY COVERAGE OF SHELIKOF STRAIT, ALASKA

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY


UTM ZONE 5
EXPLANATION
PINCH OUT OF PLEISTOCENE GLACIAL MARINE UNIT (Qgm) PLEISTOCENE UNIT PRESENT ONLY IN SOUTHWEST HALF OF AREA
STATUTE MILES
KILOMETERS
NAUTICAL MILES
CONTOUR INTERVAL 20 METERS (INDEX C.I. 100 METERS)
PENINSULA
ALASKA
SHUYAK ISLAND
AFOGNAK ISLAND
RASPBERRY ISLAND
WHALE ISLAND
SPRUCE ISLAND
UGANIK ISLAND
KODIAK ISLAND
KODIAK ISLAND
KODIAK ISLAND
NO 5-3
NO 5-4
NO 5-5
NO 5-6
UTM ZONE 5

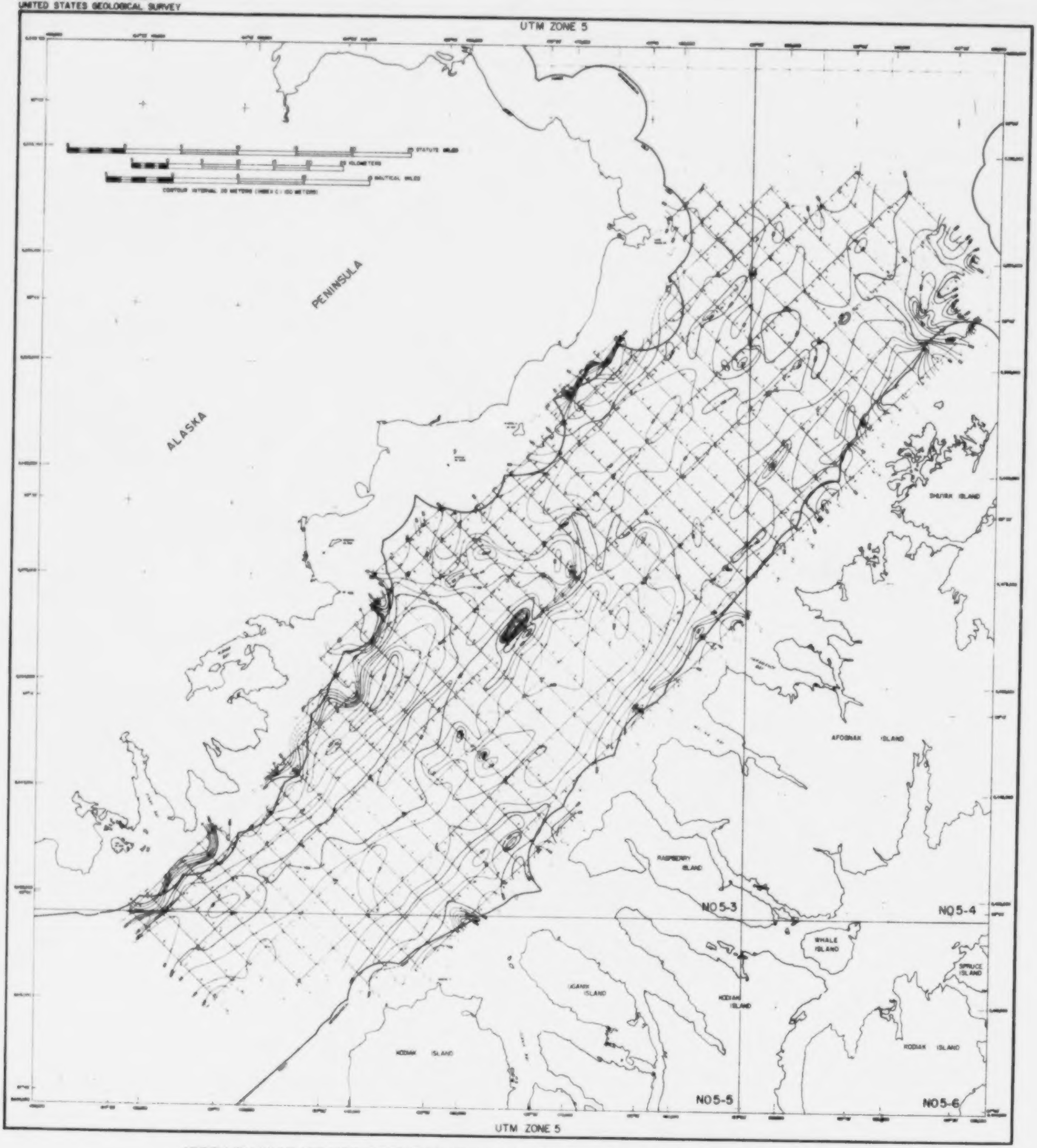
ISOPACH MAP OF QUATERNARY GLACIAL MARINE SEDIMENTS, SHELIKOF STRAIT, ALASKA

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY


UTM ZONE 5
PENINSULA
ALASKA
AFOGNAK ISLAND
RASPBERRY ISLAND
NO 5-3
NO 5-4
SHALE ISLAND
SPRUCE ISLAND
KODIAK ISLAND
KODIAK ISLAND
KODIAK ISLAND
NO 5-5
NO 5-6
UTM ZONE 5

ISOPACH MAP OF UPPER HOLOCENE MARINE SEDIMENTS SHELIKOF STRAIT, ALASKA

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY


UTM ZONE 5
STATUTE MILES
KILOMETERS
NAUTICAL MILES
CONTOUR INTERVAL
PENINSULA
ALASKA
SHUYAK ISLAND
AFOGNAK ISLAND
RASPBERRY ISLAND
NO5-3
NO5-4
WHALE ISLAND
SPRUCE ISLAND
UGANIK ISLAND
KODIAK ISLAND
KODIAK ISLAND
KODIAK ISLAND
NO5-5
NO5-6
UTM ZONE 5

ISOPACH MAP OF HOLOCENE MARINE SEDIMENTS, SHELIKOF STRAIT, ALASKA

APPENDIX N

LEASING PROCESS

The Outer Continental Shelf Lands Act of 1953, as amended, charges the Secretary of the Interior with administering mineral exploration and development on the Outer Continental Shelf (OCS), as well as conserving natural resources of the shelf. The law requires that the Secretary of the Interior develop oil and gas, in an orderly and timely manner, to meet the energy needs of the country, to protect the human, marine, and coastal environments, and to receive a fair and equitable return on the resources of the OCS. The Secretary delegated responsibility for the leasing of submerged Federal lands to the Bureau of Land Management (BLM) and the responsibility for the supervision of offshore operations after lease issuance to the U.S. Geological Survey (USGS). BLM works closely with USGS, particularly on technical matters. USGS also supervises and regulates exploration, development, and production activities after the leases are issued. The leasing process includes the following decisionmaking steps:

1. Sale Schedule: The Outer Continental Shelf Lands Act, as amended, requires the Secretary to develop a 5-year OCS oil and gas leasing program, to be revised at least once yearly. This program must consist of a schedule of proposed lease sales which the Secretary determines will best meet national energy needs for the 5-year period following its approval. The current schedule, approved in June 1980, covers the period from mid-1980, through mid-1985, and provides for 36 lease sales, including five reoffering sales. These reoffering sales will re-auction rejected-bid or no-bid tracts which were offered for sale in the previous calendar year.

2. Request for Resource Reports: Resource reports for a specific lease area are requested from numerous Federal and State agencies, generally from 2½ to 3 years prior to the scheduled lease sale date. These reports provide valuable geological, environmental, biological, oceanographic, navigational, recreational, archeological, and socioeconomic information on the leasing area to be offered, and are an important factor in determining the suitability for leasing and the possible need for mitigating measures for certain blocks within the leasing area.

3. Call for Nominations and Comments: The Call is a request for information and is published in the Federal Register. Responses are requested from oil companies and the public in general, concerning which blocks should be included in the lease sale.

4. Tentative Tract Selection: Using information received from the Call for Nominations and Comments, together with recommendations from USGS and Fish and Wildlife Service (FWS), State comments, and the Department of the Interior's own environmental, technological, and socioeconomic information, the Secretary selects a tentative list of blocks for further consideration for leasing in an environmental impact statement.

5. Scoping Meetings: Scoping meetings provide an opportunity for the OCS staff to meet with people in their own communities to surface important issues and alternatives to the proposed action. The OCS office works together with other Federal and State agencies, environmental groups, and concerned individuals to identify critical issues.

6. Preparation of Draft Environmental Impact Statement (DEIS): The issues and alternatives raised in the scoping meetings are further devel-

oped in the DEIS. Included in the DEIS are a description of the marine and onshore environments, a detailed analysis of possible adverse impacts on the environment (including cumulative impacts as a result of other projects in the area), proposed mitigating measures, any irreversible or irretrievable commitment of resources, the alternatives to the proposal, and the records of consultation and coordination with others in preparation of the statement.

7. Endangered Species Consultation: Pursuant to section 7 of the Endangered Species Act, consultation with other appropriate Federal agencies is required when there is reason to believe that a species which is on the list as endangered or threatened (or is proposed to be listed as such) may be affected by a proposed action.

8. Public Hearings: After the DEIS is released to the public, hearings are held to obtain comments on it. Oral and written comments are incorporated into the final EIS (FEIS), which is also made available to the public.

9. Secretarial Issue Document (SID): The SID is used by the Secretary to make his decision on whether to hold the sale and, if so, under what terms and conditions the sale should be held. (This document is confidential and is not available to the public until after the Secretary has made his decision and the proposed Notice of Sale has been published.)

10. Preliminary Notice of Sale: This notice is published in the Federal Register at least 90 days before the proposed sale date. It is also sent to the governors of any affected states, who then have 60 days to submit comments to the Secretary regarding the size, timing, or location of the proposed lease sale.

11. Decision and Notice of Sale: After all of the above steps have been taken, the Secretary makes his final decision on whether to hold the sale and, if so, on the terms to be included in the final Notice of Sale. The final notice, published in the Federal Register at least 30 days before the sale, may be quite different from the preliminary notice; tracts may be dropped, bidding systems may be altered, or stipulations may be added or amended.

12. Sale/Leases Issued: After the sale is held, the bids are reviewed by the Secretary and the Attorney General, and the Secretary has 60 days to accept or reject the bids.

APPENDIX O

LEGAL MANDATES AND AUTHORITY

Legal Mandates and Authority

OCS Lands Act: The Outer Continental Shelf Lands Act of 1953 (43 U.S.C. 1331 et seq.) as amended (P. L. 95-372; 92 Stat. 629), established Federal jurisdiction over submerged lands on the Outer Continental Shelf (OCS) seaward of State boundaries (generally 3 geographic miles seaward of the coastline). Under the OCS Lands Act, the Secretary of the Interior is responsible for the administration of mineral exploration and development on the OCS. The statute empowers the Secretary to grant leases to the highest qualified responsible bidder(s) on the basis of sealed competitive bids and to formulate such regulations as necessary to carry out the provisions of the act.

The act, as amended, provides guidelines for implementing an OCS oil and gas development program. From a national perspective, the basic purpose of the act is to expedite exploration and development of the OCS in order to achieve national economic and energy policy goals, assure national security, reduce dependence on foreign sources of oil, and maintain a favorable balance of payments in world trade. With respect to implementing a leasing program, this goal is constrained by the following considerations: 1) the receipt of fair and equitable return on oil and gas resources, 2) preservation and maintenance of competition, and 3) balancing orderly energy resource development with protection of the human, marine, and coastal environments. The information presented in this section will focus on the balancing of orderly resource development and environmental protection.

The Secretary of the Interior has designated BLM as the administrative agency responsible for the leasing of submerged Federal lands, and USGS for the supervision of offshore operations after lease issuance. The BLM regulations which govern the leasing of mineral deposits on the OCS and the granting of rights-of-way for pipelines on the OCS are contained in 43 Code of Federal Regulations (CFR), Part 3300. Regulations administered by USGS which govern the conduct of mineral operations are contained in 30 CFR Part 250, and are supplemented by OCS operating orders on an area-specific basis. An analysis by USGS of the Gulf of Alaska orders are included as appendix C.

Summary of OCS Law: The following discussion summarizes the provisions of the act and implementing regulations which mitigate some of the possible adverse impacts resulting from this proposal.

1. The Secretary is authorized to prescribe and amend rules and regulations at any time to provide for the prevention of waste and conservation of the natural resources of the Outer Continental Shelf and the protection of the correlative rights therein. As of the effective date, such new or amended regulations can be applied to all operations conducted under any lease.

2. The Secretary is authorized to suspend or temporarily prohibit an operation or activity pursuant to a lease or permit for environmental reasons.

3. The Secretary is authorized to cancel a lease or permit for environmental reasons.

4. The Secretary is authorized to issue regulations for unitization, pooling, and drilling agreements.

5. The Secretary is authorized to issue regulations for compliance with the national ambient air quality standards pursuant to the Clean Air Act to the extent that OCS authorized activities significantly affect the air quality of any State.

6. The Secretary may administratively cancel a nonproducing lease for the owner's failure to comply with any of the provisions of the act, the lease, or regulations under the act.

7. The Secretary may initiate a judicial proceeding to cancel a producing lease because of the owner's failure to comply with any of the provisions of the act, the lease, or regulations under the act.

8. Rights-of-way may be granted under such regulations and upon such conditions as may be prescribed by the Secretary, assuring maximum environmental protection by utilization of the best available and safest technologies.

9. Exploration must be undertaken pursuant to an approved exploration plan. No permit for drilling may be issued until all affected states with approved coastal zone management programs have concurred or have presumed to concur with the consistency determination provided by the lessee.

10. Geological explorations on unleased areas of the OCS shall be allowed only if such exploration will not be unduly harmful to aquatic life in the area, result in pollution, create hazardous or unsafe conditions, unreasonably interfere with other uses of the area, or disturb any site, structure, or object of historical or archeological significance.

11. Governors of affected states may submit recommendations to the Secretary regarding the size, timing, or location of a proposed lease sale, or with respect to a proposed development and production plan.

12. The Secretary is authorized to enter into cooperative agreements with affected states for several purposes, including but not limited to, sharing of information, joint utilization of available expertise, the facilitating of permit procedures, joint planning and review, and the formation of joint surveillance and monitoring arrangements relevant to OCS operations, both onshore and offshore.

13. The Secretary shall conduct a study of any area or region included in any oil and gas lease sale in order to establish information needed for assessment and management of environmental impacts on the human, marine, and coastal environments of the OCS and the coastal areas which may be affected by oil and gas development in such area or region.

14. Subsequent to the leasing and developing of any area or region, the Secretary may conduct additional studies to establish environmental information and may monitor the human, marine, and coastal environments of such area or region.

15. The Secretary shall consider relevant environmental information in making decisions, in developing appropriate regulations and lease conditions, and in issuing operating orders.

16. In exercising their respective responsibilities, the Secretary and the Coast Guard shall require, on all new drilling and production operations and, wherever practicable, on existing operations, the use of the best available and safest technologies which the Secretary determines to be economically feasible, wherever failure of equipment would have a significant effect on safety, health, or the environment except where the Secretary determines that the incremental benefits are clearly insufficient to justify the incremental costs of utilizing such technologies.

17. The holder of a lease or permit shall maintain all operations within such lease area or within the area covered by such permit in compliance with regulations intended to protect persons, property, and the environment on the OCS.

18. The Secretary of the Interior, the Secretary of the Department in which the Coast Guard is operating, and the Secretary of the Army shall enforce safety and environmental regulations promulgated under the act. The Secretary and the Coast Guard shall promulgate regulations for onsite inspections of OCS facilities.

19. Any person having a valid legal interest which is or may be adversely affected may commence a civil action to compel compliance with the OCS Lands Act against any person, including the United States, for any alleged violation of any provision of the OCS Lands Act, or regulation promulgated thereunder, or terms of any permit or lease issued under the OCS Lands Act.

20. The Attorney General or a U.S. Attorney may institute a civil action for a temporary restraining order, injunction, or other appropriate remedy to enforce any provision of the OCS Lands Act, regulation or order issued under the act or any term of a lease, license, or permit issued under the act. Penalties available include:

a. A civil penalty of not more than $10,000 for each day of noncompliance.

b. A fine of not more than $100,000 or imprisonment for not more than 10 years, for any person who knowingly and willfully 1) violates any provision of the act, any term of a lease, license, or permit issued pursuant to the act, or any regulation or order issued under the authority of the act designed to protect health, safety, or the environment or conserve natural resources, 2) makes any false statement, representation, or certification in any application, record, report, or other document filed or required to be maintained under this act, 3) falsifies, tampers with, or renders inaccurate any monitoring device or method of record required to be maintained under this act, or 4) reveals any data or information required to be kept confidential by this act.

21. Prior to development and production of an oil and gas lease, the lessee shall submit a development and production plan to the Secretary for approval. The Secretary will determine whether or not the plan is a major Federal action requiring the preparation of an environmental impact

statement. At least once, the Secretary shall declare the approval of a development and production plan in any area or region of the OCS, other than the Gulf of Mexico, to be a major Federal action.

22. The Secretary shall disapprove a development and production plan if:

a. the lessee fails to demonstrate he can comply with requirements of the OCS Lands Act or other applicable Federal law;

b. activities described do not receive a consistency concurrence by a state with an approved CZM plan and the Secretary of Commerce does not make the findings authorized by 307(c)(3)(B)(iii) of the Coastal Zone Management Act;

c. operations threaten national security or defense; or

d. because of exceptional geologic conditions, exceptional value in the marine or coastal environment, or other exceptional conditions exist, that 1) implementation of the plan would probably cause serious harm or damage to life, to property, to any mineral deposits, or to the marine, coastal, or human environments; 2) the threat of harm or damage will not disappear or decrease to an acceptable extent within a reasonable period of time; and 3) the advantages of disapproving a plan outweigh the advantages of development and production.

23. The Secretary shall not grant a license or permit for any activity in such a plan affecting any land or water use in the coastal zone of a state with an approved Coastal Zone Management plan, unless the state concurs or is presumed to concur with the consistency certification accompanying such plan.

24. The Secretary shall, from time to time, review each development and production plan. If the review indicates that the plan should be revised to meet the requirements of section 25 of the OCS Lands Act, the Secretary shall require such revision.

25. The Secretary shall provide affected states with information to assist them in planning for the onshore impacts of possible oil and gas development and production.

26. The Secretary of the Department of Transportation shall administer the Offshore Oil Spill Pollution Fund establishing compensation for injuries caused by oil discharges from an offshore facility or vessel.

27. The Secretary of the Department of Commerce shall administer the Fishermen's Contingency Fund which provides compensation for damage to fishermen's gear or vessels resulting from oil and gas exploration, development, and production.

Federal/State Coordination: The OCS Lands Act, as amended, provides a statutory foundation for the Department's policy of coordination of OCS activities with affected states and, to a more limited extent, local governments. At each step of the procedures that leads to lease issuance, participation from affected States and other interested parties is encouraged and sought. Set out below is a detailed discussion of coordination mechanisms required by the OCS Lands Act.

The Secretary of the Interior is required to invite and consider suggestions from the governors of any affected state during preparation of any proposed leasing program. Each such governor also receives a copy of the proposed leasing program for review and comment prior to its publication in the Federal Register. The Secretary is required to provide a written response to any request from a governor for modification of a proposed leasing program. State and local governments may comment directly on a proposed leasing program in its published form. The Secretary is obligated to establish procedures for review of proposed leasing plans and periodic consultation with state and local governments (section 18).

Within 60 days after notice of a proposed lease sale or receipt of a development and production plan, the governor of any affected state may make recommendations to the Secretary with regard to the size, timing, or location of the proposed lease sale or development and production plan. If the Secretary determines that any such recommendations provide for a reasonable balance between the well-being of the citizens of the affected state and the national interest, he must accept them. The Secretary must also respond to the governor in writing, giving his reasons for accepting, rejecting, or modifying the governor's recommendations. The Secretary may enter into cooperative agreements with affected states, for purposes consistent with the act and other applicable Federal law (section 19).

When soliciting nominations for the leasing of lands within 3 miles of the seaward boundary of any coastal state, additional information is to be provided to the governor of those states. The governor must be informed of the identity of and schedule for the area proposed for leasing; the geographical, geological, and ecological characteristics of the area within 3 miles of the seaward boundary; an estimate of oil and gas reserves in these areas; and any field, trap, or geologic structure in these areas. After the close of the call period, the governor is informed of any area which merits further consideration for leasing (section 8(g)); he is further consulted on oil and gas pools underlying the Federal and state areas and on the opportunity to enter an agreement concerning the disposition of revenues which may be generated by a Federal lease in such area.

Under section 25 of the act, the Secretary must submit copies of development and production plans to the governor of any affected state for review. The state then has 60 days to provide comments and recommendations to the Secretary. Section 11 of the act and the regulations contained in 30 CFR 250.34 also require that any exploration plans submitted to the Secretary must be approved or disapproved within 30 days. Written comments from the governor of an affected state will be considered prior to approval action if they are timely.

Under section 26 of the act, the Secretary must make available to affected States a summary of data to aid them in anticipating possible onshore effects of OCS development and production. The summary includes estimates of oil and gas reserves in areas leased or to be leased, estimated size and timing of development, pipeline location, and the general location and nature of onshore facilities.

The act also requires preparation and transmittal to each affected state of an index of all relevant actual or proposed programs, plans, reports, environmental impact statements, tract nominations, and other lease sale information. On request, the Secretary must send copies to the affected state.

Establishment of Compensatory Funds:

1. Title III of the OCS Lands Act, as amended, establishes in the U.S. Treasury an Offshore Oil Pollution Compensation Fund, to be administered by the Secretary of the Department of Transportation and the Secretary of the Treasury. This fund provides compensation for cleanup costs and pollution damages resulting from an oilspill discharged in connection with OCS activities. Compensation from this fund may be sought by any person suffering any direct or actual injury caused by the discharge of oil from an offshore facility or vessel. The fund is maintained by a fee of 3 cents per barrel of oil levied upon owners of oil produced on the OCS. The law establishes procedures to modify the fees to maintain the fund at a level between $100 and $200 million. The Department of Transportation has published final regulations implementing the Offshore Oil Pollution Compensation Fund effective March 17, 1979 (44 FR 16860, March 19, 1979), included as appendix F of the DEIS.

Claims for economic loss arising out of oil pollution may be asserted for damage to or destruction of property or natural resources, loss of income resulting from damage to or destruction of property or natural resources, and loss of use of property or natural resources. Any U.S. citizen who owns or leases property or uses natural resources involved in an oil pollution incident may present a claim to the fund. This includes subsistence users of natural resources, except that compensation is not allowed to the extent that reasonable alternatives to the affected activities were available but not utilized. In order to claim compensation for loss of income, a person must show he or she derives at least 25 percent of annual earnings from activities which use the property or natural resources. Compensation is limited to the reduction or loss of earnings or profits suffered, but is not allowed for lost employment or business when appropriate substitute employment was available but not undertaken. A claim may be made by the Federal government for loss of natural resources over which it exercises sovereign rights or exclusive management authority, or by the State of Alaska for natural resources owned or managed by the State. Compensation is allowed for the cost to restore, rehabilitate, or acquire the equivalent of the natural resources and any additional economic losses actually suffered. Federal, state, and local governments may also assert claims for tax revenues lost due to property damages. A member of a group of U.S. citizens who would be more adequately represented as a class in asserting their claims may maintain a class action to recover damages on behalf of that group.

Owners, operators, and guarantors of offshore facilities and vessels are held strictly liable for all loss attributable to oil pollution from their facilities. Except in cases of gross negligence, willful misconduct, or violation of safety regulations, liability is limited in the case of vessels to the greater of $250,000 or $300 per gross ton, and for offshore facilities, to the total cleanup and removal costs plus $35 million in damages for each incident. Evidence of financial responsibility for each offshore facility or vessel adequate to satisfy the maximum liability must be established and maintained with the Federal government. Compensation from the fund is available without limitations to the extent that losses are not compensated by other sources, such as liability insurance held by the owners, operators, and guarantors of offshore facilities and vessels.

2. Title IV of the act establishes a Fishermen's Contingency Fund to compensate commercial fishermen for damages, including loss of profits for up to 6 months, due to the damage of fishing gear and vessels stemming from OCS activities. The fund establishes area accounts from which compensation is drawn; all of the Federal OCS waters off Alaska are covered by one area account. The monies for the Alaska area account derive from fees assessed against the holders of a lease, exploration permit, easement or right-of-way on the Alaska OCS in amounts determined by the Secretary of the Interior. Each area account can be funded to a maximum of $100,000 and the law specifies procedures for replenishing the account when depleted to less than $50,000.

Compensation for gear damage is limited to repair costs or the amount of replacement cost less salvage value, whichever is least. Claims are presumed valid upon filing a report within 5 days after the date when the damage or loss is discovered. The report must specify a number of items which establish the vessel was used in commercial fishing activity and was located in an area affected by OCS operations, and that no record existed on nautical charts or Notice to Mariners of the obstruction causing damage and no marker or lighted buoy spotted the location of the obstruction. A more extensive claim report must be filed no later than 60 days after the date the claimant discovers the damage.

As with the Offshore Oil Pollution Contingency Fund, the Fishermen's Contingency Fund shall not provide compensation if compensation is available from another source, such as a financially responsible party or insurance. Also, both funds become subrogated to all rights of any claimant against any person found responsible for damaging the claimant, upon payment of compensation.

Final regulations implementing the Fishermen's Contingency Fund were issued by the National Marine Fisheries Service National Oceanic and Atmospheric Administration, on January 24, 1980 (45 FR 6062) effective January 24 and February 25, 1980, and are included as appendix G of the DEIS.

3. A National Contingency Fund for cleanup and other removal costs of spills of oil or hazardous substances is authorized by section 311(k), the Federal Water Pollution Control Act. This revolving fund provides only for cleanup costs; damages to private citizens, such as loss of earnings, are not covered.

Environmental Studies Program: The OCS Lands Act, as amended, authorizes the Secretary to conduct studies in areas or regions of lease sales to assess and manage the "environmental impacts on the human, marine, and coastal environments of the Outer Continental Shelf and the coastal areas which may be affected by oil and gas development" (43 U.S.C. 1346). Studies in the Cook Inlet/Shelikof Strait area are described in section III.G.

The act specifies that studies will be conducted in a proposed lease area at least 6 months prior to the conduct of a lease sale. The act also emphasizes studies which develop information necessary for "assessment and management of environmental impacts," and studies designed to predict impacts on the marine biota resulting from chronic low-level pollution or large spills, from the introduction of drill cuttings and muds, and from the laying of pipelines. Subsequent to leasing, the Secretary shall conduct such additional studies as necessary to identify any significant changes in the quality and productivity of such environments, to establish trends in the areas studied and monitored, and to design experiments for identifying the causes of such changes.

The National Outer Continental Shelf (OCS) Advisory Board and the Intergovernmental Planning Program: The National OCS Advisory Board has been reorganized into a policy committee, a scientific committee, and six regional technical working group committees. The policy committee will perform the board's historic function of advising the Secretary of the Interior on OCS policy matters. The scientific committee will make recommendations to the Department concerning the scope and direction of the Bureau of Land Management's Environmental Studies Program.

The technical working groups participate in a new program that has been established to provide a formal mechanism for regional coordination and planning of three elements of the OCS program administered by the BLM: 1) the leasing process, 2) the Environmental Studies Program, and 3) OCS oil and gas transportation planning. Called the Intergovernmental Planning Program (IPP) for OCS Oil and Gas Leasing, Transportation, and Related Facilities, the program has been initiated in Alaska by the Alaska Regional Technical Working Group. The committee's membership has the requisite expertise to advise the Director, Bureau of Land Management, on detailed, technical issues throughout the OCS program.

The IPP constitutes a cooperative advisory planning process among Federal and state agencies, private interests, and the petroleum industry. The program is designed to coordinate working group activities with the major steps and decision points in the OCS leasing and development process. To accomplish this, meeting agendas are developed around four phases, each with specific objectives, beginning prior to the Call for Nominations and Comments for a lease sale, and continuing up to the time development plans are submitted for the sale area. There will be an initial period during which the phases in the program must be modified since the OCS program in each region is now beyond the point of the Call for Nominations for the first sale. The following paragraphs summarize the major issues and the intended results of each phase.

During Phase I, which begins prior to the Call for Nominations, the Alaska Group will: 1) identify regional OCS issues and data needs, 2) make tract selection recommendations, 3) advise BLM on environmental statement development scenarios and lease stipulations, and 4) preliminarily identify potential pipeline corridors for future study. This phase could last about 2 years and will be completed by the time of a sale decision.

Phase II will be implemented at the time of the sale decision. The Alaska working group will recommend transportation-related studies for inclusion in BLM's Regional Studies Plan. Other proposed studies may also be identified to be funded and conducted by other Federal or state agencies. These regional studies should be completed prior to completion of Phase II, which could extend over a 2- or 3-year period, and end with the first commercial discovery in the proposed sale area.

At this point, a sub-state working group will be formed to continue refining potential pipeline corridors that would affect specific areas in Alaska. The state working group would include all Federal and private members in addition to ad hoc members of affected areas. Phase III will begin with the first marketable discovery in the region and will involve the design and implementation of a site-specific studies plan. These studies will be based upon the results of the regional studies and will provide the data needed to develop a Transportation Management Plan (TMP).

Phase IV begins with the completion of the site-specific studies and consists of preparation of a TMP. The TMP will include the identification and analysis of alternative pipeline corridors, the description of onshore areas suitable for the location of pipeline support facilities, an evaluation of surface vessel transportation alternatives, and identification of stipulations or use restrictions for applications to pipeline rights-of-way.

BLM will use the TMP in developing policies for granting pipeline rights-of-way. The TMP should be completed prior to submission of the first development and production plan for the region in order to provide information to the company preparing the transportation component of the plan and to BLM for reviewing pipeline rights-of-way applications.

APPENDIX P

FEDERAL REGULATORY RESPONSIBILITIES

Federal Regulatory Responsibilities

Department of the Interior: BLM and USGS are departmental agencies with direct OCS regulatory and enforcement authority. BLM implements the OCS leasing regulations under 43 CFR Part 3300 and cooperates with USGS and other Federal agencies to develop special stipulations that apply to either specific leases or all leases within the proposed lease area. These stipulations address such matters as cultural and biological resources, pipeline rights-of-way, disposition of drilling wastes, and equipment identification. In addition to issuing leases, BLM issues rights-of-way for common carrier pipelines on the OCS. BLM also issues permits and designates an authorized officer to manage each permit relative to protection of coral in the vicinity of proposed OCS operations.

USGS administers regulations governing mineral operations and development of the OCS under 30 CFR Part 250. These regulations are the basis for OCS operating orders which apply to operations in the proposed lease area. See appendix C for a discussion of USGS Gulf of Alaska operating orders for this proposal. Additionally, USGS maintains jurisdiction over producer-owned gathering lines and flowlines on the OCS.

The U.S. Fish and Wildlife Service (FWS) shares responsibilities with other agencies for protection of fish and wildlife resources and their habitats, and acts in an advisory capacity in the formulation of OCS leasing stipulations. It also provides recommendations to the Corps of Engineers in the issuance of Federal permits to industry for construction in navigable waters. FWS is also responsible for the protection and stewardship of certain species covered under the Endangered Species Act of 1973 and the Marine Mammal Protection Act of 1972.

U.S. Army Corps of Engineers: The OCS Lands Act provides authority to the Secretary of the Army to prevent obstruction to navigation in U.S. navigable waters, and to prevent obstructions caused by structures located on the OCS. Section 10 of the Rivers and Harbors Act of 1899 (30 Stat. 1151) requires that permits be issued for all offshore construction, including pipelines, in U.S. navigable waters.

Permits must also be issued for onshore facilities in which dredging and filling of U.S. navigable waters are involved. Structure permits for exploration drilling vessels and for fixed and mobile platforms are issued by the Corps. Environmental requirements must be considered prior to issuance of permits for structures in state waters pursuant to section 404 of the Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977. Section 404 also delegates regulatory authority to the Secretary of the Army for discharge of dredged or fill material in wetlands.

Department of Transportation (DOT): The OCS Lands Act grants authority to the Coast Guard to promulgate and enforce regulations covering lighting and warning devices, safety equipment, and other safety-related matters pertaining to life and property on fixed OCS platforms and drilling vessels. Through the Coast Guard, the Department of Transportation advises the Corps of Engineers on the issuance of permits and the placement of offshore structures. Under the Port and Tanker Safety Act of 1978, the Coast Guard has the authority to establish shipping safety fairways and other ship routing systems in which OCS structures may be prohibited. The Coast Guard also has jurisdiction to enforce the Clean Water Act of 1977 on the OCS.

Under the Federal Water Pollution Control Act, the Coast Guard approves the procedures to be followed and the equipment used for the transfer of oil from vessel to vessel and between onshore and offshore facilities and vessels. The Coast Guard also conducts pollution surveillance patrols to detect oil discharges within territorial and contiguous waters and has enforcement authority over violations. Should an oilspill occur, the Coast Guard also has strike team responsibilities under the National Oil and Hazardous Substances Pollution Contingency Plan, as provided by the Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977.

The Materials Transportation Bureau is responsible for establishing and enforcing design, construction, operation, and maintenance regulations for pipelines. The Department of Transportation's responsibility and authority is further defined in a Memorandum of Understanding between it and the Department of the Interior.

Department of Commerce: The Department of Commerce, through the National Oceanic and Atmospheric Administration (NOAA), is responsible for protection of marine fisheries resources and their habitats, and for providing recommendations to the Corps of Engineers as the entity which issues permits in navigable waters.

The Department's responsibilities and authorities related to OCS development include the Fishery Conservation and Management Act of 1976, the Marine Mammal Protection Act of 1972, the Endangered Species Act of 1973, the Fur Seal Act of 1966, title II of the Marine Protection, Research, and Sanctuaries Act of 1972 ("Comprehensive Research on Ocean Dumping"), and the National Ocean Pollution Research and Development and Monitoring Act of 1978.

Coastal Zone Management Act: The Coastal Zone Management Act of 1972, as amended (16 U.S.C. 1451-1464) (CZMA) is administered by NOAA. The CZMA establishes a procedure for each coastal state to develop a management program for the sound management of state coastal resources. The act provides Federal grants for both development and implementation of these programs; in order to be implemented each program must be approved by the Secretary of Commerce. The act also creates a grants and loans program for participating states that must deal with the coastal zone impacts of OCS oil and gas and other energy development.

Section 307 of the CZMA contains the Federal consistency provisions which impose certain requirements on Federal agencies to comply with approved state coastal zone management programs.

Section 307(c)(1) requires Federal agencies conducting or supporting activities directly affecting the coastal zone to be consistent to the maximum extent practicable with a state's coastal program. This requirement applies to pre-lease activities which lead up to the actual lease sale. Pursuant to NOAA's Federal consistency regulations (15 CFR Part 930), prior to a lease sale the Department must first determine if the pre-lease activities "directly

pre-lease activities

affect" the coastal zone. If so, the Department must prepare a consistency determination and submit it to the state. If not, the Department makes a "negative determination."

Section 307(c)(3)(A) prohibits Federal agencies from issuing a license or permit for any activity that affects a land use or water use in the state's coastal zone until a state with an approved coastal zone management program has agreed or can be presumed to agree that the activity subject to the license or permit is consistent with the approved program, or until the Secretary of Commerce has overridden the state's objections to the activity.

Section 307(c)(3)(B) of the CZMA consistency provisions is very important to OCS resource development. This provision requires that no Federal license or permit for an activity described in detail in an OCS exploration plan or development and production plan which affects a land use or water use in the coastal zone may be approved until a state with an approved coastal zone management plan has concurred in the consistency determination made by the lessee or until the Secretary of Commerce has overridden the state's objections.

Finally, under Section 307(d), Federal agencies may not provide Federal assistance to a state or local government for proposed projects affecting the coastal zone that are inconsistent with a State's coastal management program except upon certain findings by the Secretary of Commerce. These Section 307 provisions will have important implications for any exploration, development, and production of OCS oil and gas resources and associated onshore development.

Under the Marine Protection, Research, and Sanctuary Act of 1972 (16 U.S.C. 1431-1434), the Secretary of Commerce is empowered to designate areas as marine sanctuaries "as necessary for the purpose of preserving or restoring such areas for their conservation, recreation, ecological, or esthetic values," following consultation with the Secretaries of State, Defense, Interior, and Transportation, with the Administrator of EPA, and with other interested agencies. Once an area is designated a marine sanctuary, NOAA's Office of Coastal Zone Management is required to issue "necessary and reasonable regulations" for control of activities permitted within the marine sanctuary. Multiple uses (including oil and gas development) could be permitted within a marine sanctuary, providing these uses are consistent with the regulations governing the sanctuary.

Department of Energy (DOE): With respect to OCS leasing, and in consultation with the Secretary of the Interior, DOE is authorized under the Department of Energy Organization Act, (91 Stat. 565 1977) to foster increased competition for leases, to implement authorized systems of bidding, to establish due diligence requirements for OCS operations, to set rates of production for leases, to define handling of royalty production, and to determine amounts of OCS gas purchased and transported. DOE has broad authority over approval, design, and economies of common carrier gas pipelines.

In addition, DOE provides support to the Leasing Liaison Committee, whose function is to coordinate leasing policies of the Department of the Interior with DOE policies. Section 27 of the OCS Lands Act, as amended, requires DOI consultation with DOE concerning the disposition of Federal royalty oil.

The Federal Energy Regulatory Commission (FERC), within DOE, has the authority under the Natural Gas Act to issue certificates of public convenience and necessity for proposed projects involving the transportation or sale of natural gas in interstate commerce. All natural gas produced from the OCS is considered to be interstate and, therefore, is subject to FERC jurisdiction. The Natural Gas Act, the National Environmental Policy Act, and OCS Lands Act Amendments of 1978 all grant authority for or require that the FERC investigate the environmental effects of a proposed offshore project, as well as the potential gas reserves, the need for this gas, and the availability of capital to develop this resource. Also, the FERC is primarily responsible for administering and enforcing the Natural Gas Policy Act (NGPA) of 1978 (92 Stat. 3350). As applied to OCS matters, the NGPA provides new wellhead pricing controls for certain natural gas produced from the OCS.

Environmental Protection Agency: The Federal Clean Water Act, as amended (33 U.S.C. 1251, et. seq.), provides several authorities applicable to wastewater discharges from OCS operations. These authorities are administered by the EPA and include the following:

> Section 403(c) of the act requires EPA to promulgate ocean discharge criteria which consider the effects of pollutants disposed upon multiple ocean use objectives. These criteria, published October 3, 1980, and effective November 3, 1980, are used as guidelines in EPA's issuance of National Pollutant Discharge Elimination System (NPDES) permits.
>
> Section 301(b)(1)(a) of the act requires EPA to issue effluent limitations for existing point sources of wastewater discharge which reflect the application of "best practicable control technology currently available" (BPTCA or BPT; 33 U.S.C. 1311(b)(1)(a)). The BPTCA standards would apply to existing OCS exploratory drillships, semisubmersible vessels, jack-up rigs, etc., used in exploration operations.
>
> Section 301(b)(2)(a) requires EPA to promulgate effluent limitations for categories and classes of point sources which shall require application of "best available control technology economically achievable" (BAT). The limitations regard toxic pollutants identified in the act and would apply to both exploration and production operations on the OCS.
>
> Section 306(b)(1)(B) of the act requires the EPA to promulgate Federal standards of performance in pollution control from new sources for categories and classes of industries designated either in the act or at the Administrator's discretion.
>
> Section 307(a)(1) of the act requires the EPA to promulgate a list of toxic pollutants for purposes of pollution control. Section 307(a)(2) requires the EPA to promulgate effluent limitations for each of the identified toxic pollutants.
>
> Section 402(a)(1) of the act confers permitting authority upon the EPA to meet the regulatory responsibilities of several sections of the act, e.g. sections 301, 306, and 307 mentioned above. The National Pollution Discharge Elimination System (NPDES) falls under this section of the act; it applies to all sources of wastewater discharges from exploratory vessels and production platforms operating on the OCS.

Presently, EPA requires drilling fluids to be discharged at a rate less than a 30 bbl/hr along with a dilution ratio of 40:1 bbl seawater to discharge fluid. This limitation is imposed during the season of commercial crustacea reproduction and larval growth. EPA also presently imposes a limitation on aromatic hydrocarbons of 10 ppm. EPA also imposes a standard of no free oil discharge with deckdrain wastes and an oil and grease standard of 48 mg/l average or 78 mg/l maximum in the oil/water separator discharges.

USGS Operating Orders for its OCS operations in the Gulf of Alaska include an order No. 7 "Pollution Prevention and Control." Sections 1.1.1 and 1.1.4 of order No. 7 reference EPA authority over regulation of drilling fluids, deck-drainage, produced waters, and sanitary wastes (44 FR 76246-47). Refer to appendix C of this EIS for an analysis of the USGS Operating Orders for the Gulf of Alaska.

The Clean Water Act (91 Stat. 1566 (1977)), which amended the FWPCA, also applies to offshore operations and provides that lessees or operators be held financially liable for damages due to oilspills. It provides for a liability up to $50 million for actual costs of oil removal and cleanup (except where without fault of operator or owner), as well as replacement or restoration costs of natural resources damaged or destroyed by a spill.

EPA is also primarily responsible for facilities not related to transportation, such as terminal and storage facilities, and permits for any discharges would be issued by EPA or designated states according to established effluent guidelines. Provisions of the Clean Water Act also apply to onshore facilities and OCS-related activities.

Interstate Commerce Commission: The Interstate Commerce Commission grants approval of the tariff rates for transportation of oil by common-carrier pipelines.

APPENDIX Q

DESCRIPTION OF THE ENVIRONMENT ECONOMY

a. State and Regional Economy: In the section below the current local economic situation in Kodiak is described to provide background for later sections describing significant possible impacts of sale 60 on the area. State, regional, and some non-Kodiak, non-Kenai local community background (Seward or Homer) is not presented because of the low impact of sale 60 on the areas. For this State, regional, and non-Kodiak, non-Kenai economic background information, see University of Alaska, Institute of Social and Economic Research (1978, 1980), and Alaska Consultants, Inc. (1979). The description of the local Kodiak economic area is taken from the second study.

b. Local Economy - 1, Kodiak Census Division: Kodiak's future growth and prosperity is inextricably tied to growth in this community's primary industry, fishing and fish processing. Other sources of economic strength include the continued presence of the U.S. Coast Guard in the area plus some probable expansion in tourism and recreation activities and in wood products. The investment plans of the regional and village corporations established under the terms of the Alaska Native Claims Settlement Act will also be a factor in the future growth of both Kodiak and other communities on the island.

Present fisheries activity in the Kodiak area centers around the exploitation and processing of king, tanner, and Dungeness crab, shrimp, salmon, and lesser amounts of other species. Employment in this sector of the area's economy has grown significantly during the past few years. In large part, this is due to the growth of the tanner crab fishery which has led to increased employment during the winter months and, thus, to gains in annual average employment. See sections III.C.2.b. and c. for more detail.

Continued growth in Kodiak's fishing and fish processing industry is anticipated. While some of this growth will come from the recovery and stabilization of catches in traditional fisheries, bottomfishing offers the greatest potential for major increases in employment and population in the Kodiak area. Some effort toward establishing a bottomfish industry in the Kodiak area has already been made. After the establishment of a 200-mile offshore territorial limit, American fishermen and processors became increasingly interested in exploiting bottomfish resources. Kodiak and/or the Aleutians (Dutch Harbor) may be the most logical locations for the establishment of a major bottomfish operation.

The Kodiak Coast Guard station is anticipated to remain at or around current strength in the future unless major new developments such as the exploitation of oil and gas resources in the Gulf of Alaska take place. The Coast Guard base recently increased its complement of personnel following the establishment of a 200-mile offshore U.S. territorial limit and no further expansion is foreseen except under new conditions such as that mentioned above.

The wood products industry is currently not significant in the Kodiak area. However, depending on the future status of Afognak Island, i.e., whether or not it is selectable by Native corporations established under the terms of the Alaska Native Claims Settlement Act, this industry could become a small but significant element in the economy of the Kodiak area.

Finally, the investment plans of the Native corporations based on Kodiak Island including Koniag, Inc., the regional corporation, and the various village corporations, promise to play an important role in the economic future of the Kodiak area. While the status of some of the village corporations is still subject to litigation, the island's Native residents will ultimately become its major private landowners and will control virtually all coastal lands outside the immediate Kodiak area which are not in Federal ownership. Given the marine orientation of all communities on Kodiak Island, the Native corporations will thus be in a good position to influence new economic development in this area, including the possible exploration and exploitation of outer continental shelf oil and gas resources of the western Gulf of Alaska.

Employment: As shown in table III.C.2.b.-1, by far the largest sector of the Kodiak division's nonagricultural wage and salary employment in 1976 was manufacturing, almost all of which was associated with seafood processing. This sector averaged 1,639 employees in 1976 and accounted for 36.5 percent of the division's total nonagricultural employment. A large proportion of fishermen are not included in state nonagricultural wage and salary statistics. However, it is assumed that essentially all 406 jobs (or 9% of the total) recorded in the miscellaneous sector in 1976 were held by fishermen. Virtually all jobs in fishing and fish processing in the Kodiak area can be considered basic, as only very minor amounts of fish are produced for local consumption.

After manufacturing, government was the largest employment sector in the Kodiak division in 1976. State and local government employment, as recorded by the Alaska Department of Labor, was the major subsector with most of this employment assumed to be in local government. The largest single local government employer is the Kodiak Island Borough School District. However, Federal Government employment is also a very significant element in Kodiak's economy. The largest Federal employer is the U.S. Coast Guard station which reported 175 civilian employees in 1978. Not included in State statistics, however, are 1,000 service personnel (and their families) stationed in the community. All Coast Guard personnel, both civilian and military, can be considered basic employees. A share of state and other Federal employment in the Kodiak Island area can also be considered basic.

Of the remaining sectors of the Kodiak division's economy in 1976, the trade and service sectors were the most heavily represented. Kodiak has well developed trade and service sectors, with a portion of this employment judged to be basic since it is derived from providing goods and services to the transient fishing fleet and processing plant workers. The division had an annual average of 512 employees in trade and 406 in services in 1976, accounting for 11.4 and 9.0 percent, respectively, of total nonagricultural wage and salary employment.

Contract construction averaged 253 employees in the Kodiak division in 1976. A large share of these employees were probably basic as the Coast Guard station saw a good deal of construction activity after the takeover of this facility from the Navy in 1972. Other major construction projects in the Kodiak division in 1976 are unknown but presumably at least some were also associated with basic activities.

The transportation, communications, and public utilities sectors averaged 213 employees in the Kodiak division in 1976 and accounted for 4.7 percent of total nonagricultural wage and salary employment. Most employees are probably secondary.

Table III.C.2.b.-1
Nonagricultural Wage and Salary Employment Distribution
Kodiak Labor Area
1970-1976

	1976		1970 - 1976
	Number	Percent	% Change
Mining	0		
Contract Construction	253	5.6	450.0
Manufacturing	1639	36.5	120.6
Transportation, Communications, and Public Facilities	213	4.7	- 1.8
Trade	512	11.4	4.0
Finance, Insurance, and Real Estate	105	2.3	
Service	406	9.0	113.7
Miscellaneous	428	9.5	95.4
Government	894	19.9	6.7
Federal	(278)	6.2	(-28.2)
State and Local	(616)	(13.7)	(36.6)
TOTAL	4487	100.0	68.6

Source: Alaska Consultants, Inc., 1979. Table 84, p. 406.

Kodiak functions as a redistribution point for waterborne freight destined for the Prince William Sound area and the Aleutians. The island is also served by several airline and air taxi operators. Employees are primarily basic.

Finance, insurance, and real estate averaged 105 employees in 1976, or 2.3 percent of the Kodiak division's total nonagricultural wage and salary employment. While many of these employees are associated with the operation of banks, insurance firms, and real estate operations, a significant number are employees of Native corporations. Employees of Native corporations can be considered part of the basic employment picture.

Unemployment and Seasonality of Employment: Employment in the Kodiak division exhibits much less seasonal variation than most Alaska areas with economies based heavily in fishing and fish processing. In 1976, the most recent year for which complete figures are available, total nonagricultural wage and salary employment in the Kodiak division ranged between about 83 percent and 129 percent of the annual average. This degree of seasonality is far less extreme than the Cordova-McCarthy division, for example, which has a greater dependence on the salmon fishery than Kodiak. Nevertheless, the Kodiak area exhibits more employment seasonality than the Anchorage division where total nonagricultural wage and salary employment ranged between about 92 and 107 percent of the annual average in 1976.

Unemployment in the Kodiak division varies seasonally. In 1976, local unemployment rates ranged between 5 and 6 percent of the total civilian labor force from July through October and between around 9 to 10 percent for the remainder of the year. The total civilian labor force peaked in August at 5,359 persons, with an unemployment rate of 5.7 percent recorded for that month. The "low" unemployment month was October when only 5.3 percent of the civilian labor force was recorded as unemployed. By October, the transient salmon fishermen have left the area and the total civilian labor force for that month in 1976 was down by approximately 1,000 persons from August. October normally sees a heavy king crab fishing effort before the winter weather sets in and, thus, a very low proportion of the labor force is recorded as unemployed at this time of year.

Recent Employment Trends: As shown in table III.C.2.b.-1, total nonagricultural wage and salary employment in the Kodiak division rose almost 69 percent between 1970 and 1976, a healthy rate of growth but lower than the approximately 84 percent rate recorded for the state as a whole. However, statewide figures were severely impacted by pipeline construction while the Kodiak area was little affected by this activity.

Employment in the manufacturing sector increased slightly more than 120 percent in the Kodiak division between 1970 and 1976. This represents a major gain in the area's primary basic industry, fishing and fish processing. To a large degree, this increase is due to a switch by a number of Kodiak area plants to more of a year-round operation which, aside from increasing total employment, has also tended to lessen the degree of employment seasonality. Growth in the miscellaneous sector, which includes some, but by no means all, of the area's fishermen, also registered a healthy 95-percent rate of increase between 1970 and 1976.

Contract construction accounted for the largest proportional increase (450 percent) in employment in the Kodiak division between 1970 and 1976. However, apparent gains in this sector are misleading. Construction activity appears to have been at an abnormally low level in 1970, whereas improvements to the Coast Guard base after this facility was taken over from the Navy contributed much to the higher levels of employment in this sector in the mid-1970's.

Employment in the service and trade sectors registered 114 and 48 percent gains, respectively, between 1970 and 1976, with some of this growth doubtless taking place in response to growth in basic industry. During this same period, however, employment in transportation, communication, and public utilities declined slightly (by almost 2%).

Government employment recorded a modest 6.7 percent rate of increase in the Kodiak division between 1970 and 1976. State and local government registered near 37 percent increase during this period, with most of this growth assumed to have taken place in the local government subsector. Federal Government employment, on the other hand, declined by 28.2 percent during the 1970-1976 period. This decline followed the closure of the Kodiak Navy base in 1971.

Occupational Skills: Comprehensive information on the skills of the workforce of the Kodiak area is not available, nor are there reliable or current statistics developed for individual communities.

Income Levels: According to the 1970 U.S. Census, the median income of families in Kodiak and the Kodiak census division in 1969 was $12,854 and $11,166, respectively. The median income for Kodiak was slightly above that statewide in 1969 of $12,443, whereas that for the census division were depressed by the former Kodiak Naval Station where a median 1969 income of only $8,645 was recorded. Thus, it can generally be said that the civilian population of the Kodiak area enjoyed incomes comparable or slightly above those statewide in 1969.

A review of average monthly wages by industry sector for nonagricultural industries in the Kodiak division from 1975 through the third quarter of 1977 indicates that the highest average monthly wages in this area are realized in the agriculture, forestry, and fisheries sectors. This group includes all fishermen counted in nonagricultural wage and salary statistics and realized an average monthly wage of $3,006 during the third quarter of 1977. No comparable group was listed statewide.

After agriculture, forestry, and fisheries, the highest average monthly wages in the Kodiak area during the third quarter of 1977 were registered in contract construction ($2,588). While this was a healthy average monthly wage, it was well below average rates recorded for the State during that quarter ($4,041).

Average monthly wages in the Kodiak division for the third quarter of 1977 were above those recorded statewide in the retail trade (($973 versus $960) and government sectors. In the government sector, the average monthly wage for the third quarter of 1977 was significantly above statewide averages in Federal ($1,885 versus $1,357), State ($1,824 versus $1,532) and local ($1,460 versus $1,386) government subsectors in the Kodiak division. In all other employment sectors, however, the average monthly wage in the Kodiak division was below State averages during this period.

Although unemployment is not generally seen as a problem in the Kodiak area, welfare payments in the form of general assistance from the Bureau of Indian Affairs and public assistance program payments distributed by the Alaska Department of Health and Social Services are significant sources of income to some Kodiak households. The Bureau of Indian Affairs distributed a total of $23,258 to 22 individual "cases" in the Kodiak area in FY 1977 (table III.C.2.b.-2). However, the total amount paid under this program in FY 1977 was less than half that paid out in FY 1972.

Statistics provided by the Alaska Department of Health and Social Services Division of Public Assistance indicate that $24,771 was distributed to 113 individual "cases" in Kodiak during a typical month in 1977, for an average monthly payment of $113 (table III.C.2.b.-3). Almost 80 percent of these funds involved Aid to Families with Dependent Children payments.

Major Industries

Fishing and Fish Processing Industry: See graphics 3 through 8 and section III.B.2. for details regarding this subject.

Tourism Industry: Tourism is currently a minor economic activity in the Kodiak area, but it is an industry which has some potential for expansion. Kodiak has traditionally been somewhat "off the beaten track" for tourists. See sections III.C.4. and III.C.6. for further information on tourism and transportation.

Kodiak has expressed interest in increased tourist activity. According to Kramer, Chin, and Mayo (October 5, 1977), the Kodiak Chamber of Commerce has created a "visitors and convention bureau" for the purpose of seeking conventions and the development of pre-convention tours in conjunction with the city of Anchorage. In addition, Kramer, Chin, and Mayo reported that tour ship calls at Kodiak could show further increases in the future.

Military Industry: The military has been a factor in Kodiak's economy since 1941 when the Kodiak Naval Air Station was established. A naval operating base and submarine base were added in 1974 and Fort Greely, an Army garrison, was also established here during this period. According to Chaffin (1967), there were some 2,500 civilian contract workers in Kodiak, an Army garrison of 7,600 and around 773 Navy men at the peak of wartime activities.

Today, military activities play a significant, but much less dominant role in Kodiak's economy. Fort Greely closed with the cessation of hostilities in World War II but the naval base remained. Increases in personnel occurred during the Korean War and again in the early 1960's, but World War II total military personnel levels were never again reached. According to Development Research Associates, Inc. (February 27, 1968), there were approximately 2,436 military personnel in the Kodiak area in 1965 but that this had dropped significantly to 1,693 in 1967, plus 313 civilian employees. Naval strength continued to decline after 1967 and the base was formally closed in 1971, shortly after which it was taken over by the U.S. Coast Guard.

The Coast Guard has been active in the Kodiak area since the summer of 1947 when an air detachment with 37 men and a couple of planes was stationed here. By 1957, the air detachment had assumed several other duties and had 12 pilots

Table III.C.2.b.-2
General Assistance Payment 1/
Kodiak, Alaska
FY 1972 - FY 1977

	FY 1972	FY 1973	FY 1974	FY 1975	FY 1976	FY 1977
Total Payment	$50,067	$60,758	$20,802	$21,796	$16,859	$23,258
Number of Cases	55	66	29	39	12	22
Average Payment:						
Annual	$ 910	$ 921	$ 717	$ 559	$ 1,405	$ 1,507
Monthly	$ 76	$ 77	$ 60	$ 47	$ 117	$ 88

1/ Payments made by the Bureau of Indian Affairs.

Source: Alaska Consultants, Inc., 1979. Table 89, p. 416.

Table III.C.2.b.-3
Public Assistance Program Payments
Kodiak, Alaska
October 1977 1/

	Old Age Assistance	Aid to the Blind	Aid to the Disabled	Aid to Families with Dependent Children	Total
Total Payment	$ 2,652	$ 259	$ 2,484	$19,376	$24,771
Number of Cases	23	2	19	69	113
Average Payment	$ 115	$ 130	$ 131	$ 281	$ 219

1/ October is considered to be a representative month for public assistance payments.

Source: Alaska Consultants, Inc., 1979. Table 90, p. 416.

and 50 enlisted men. In addition, the Coast Guard cutter, Storis, which currently has a complement of 79 men, was stationed in Kodiak that year. Coast Guard strength in the Kodiak area continued to increase and, at the time of its takeover of the the Navy facility in 1972, approximately 500 military personnel were stationed in the community.

Since 1972, the number of Coast Guard personnel stationed in the Kodiak area has almost doubled. According to Kodiak Coast Guard planners, there are currently about 980 active duty military personnel in this area, plus approximately 175 civilian employees. All but about a half dozen military personnel live on base, but an estimated half of the civilian employees live in Kodiak itself. Including dependents, Kodiak has an on-base population of around 2,500 people. This figure includes some other nonmilitary personnel such as employees of the Federal Aviation Administration, the National Weather Service, and the National Marine Fisheries Service.

Today, the Coast Guard has 10 commands in the Kodiak area. These include the support center, the air station, the Spruce Cape and Narrow Cape Loran stations three homeported cutters (the Storis, the Citrus, and the Confidence), marine safety, communications, and the Loran monitoring station. In terms of employment, the support center (with 292 military and 150 civilian employees), the three cutters (with a combined total of 199 men), the air station (with 351 employees) and communications (with 49 men) are the most significant. However, three other commands: marine safety (1975), the Narrow Cape Loran station (1977), and the Loran monitoring station (1977) have only recently been established. The tenth command, the Spruce Cape Loran station, is scheduled to be phased out as of December 31, 1979. However, since this command has only eight employees, its closure will have only a very minor impact on military employment in the Kodiak area.

Military-related activities are normally associated with low multiplier factors in terms of their ability to support secondary employment. To some extent, this is true in Kodiak since almost all personnel live on base and have post exchange privileges. Furthermore, except for education and telephone services, the base makes few demands on local community facilities. Nevertheless, the Coast Guard does have a significant impact on Kodiak's economy in that it is a major civilian employer and that it acts as a support for Kodiak's primary industry, fishing and fish processing. Furthermore, unlike the former Naval station which had few dependents, the Coast Guard base has a large dependent population, some of whom work in town.

According to Kodiak Coast Guard planners, current personnel levels in this area are likely to remain fairly constant in the future. Recent increases in military strength at Kodiak have been primarily in response to the establishment of a 200-mile offshore U.S. territorial limit and to an upgrading of Coast Guard communications systems. Even if commercially significant discoveries of oil and/or gas should be made offshore in this area, no large increases in military personnel at Kodiak are anticipated. In the opinion of Kodiak Coast Guard planners, the base has adequate flexibility to handle such situations without major increases in personnel.

Timber Industry: The wood products industry is not important on Kodiak Island. However, nearby Afognak Island presently is within the Chugach National Forest and has a sizable commercial timber resource, estimated by the Forest Service

(July 12, 1974) at 4.6 billion board feet of presently operable sawtimber. Commercial Sitka spruce stands occupy approximately half of Afognak Island's 185350 hectares (458,000 acres) area. If these stands were managed for sawtimber products, the Forest Service has estimated that they could sustain an annual cut of approximately 30 million board feet.

A large timber sale on Afognak Island, the 48563.3 hectares (120,000 acres) Perenosa sale, was held in 1968. Of this area, 8498.6 hectares (21,000 acres) were to be clearcut. However, no activity on this sale took place until the fall of 1975. Since that time, approximately 7.5 million board feet are going to the mill at Jakolof Bay near Seldovia and 5.5 million board feet have been cut for round log export as the result of an agreement between the Forest Service and the eventual Native landowners. (Privately owned lands are not subject to the primary manufacture before export requirement.)

A smaller 6.7 million board feet timber sale at Raspberry Strait was held in November 1971. The successful bidder was Dalmond Valley who subsequently third partied it to Southcentral Timber Development Corporation, a Japanese-controlled firm, in February 1973. This sale was closed in February 1977. The future of the wood products industry on Afognak Island is presently obscured by uncertainties as to who will ultimately control the island's timber resources. Koniag, Inc. the regional Native corporation for the Kodiak Island area, has proposed to select all of Afognak Island except for authorized Native village selections. At the other extreme, non-village selections, approximately 125455.3 hectares (310,000 acres), are proposed to be transferred to the National Wildlife Refuge System. If the latter case came to pass, it is assumed that no logging on refuge lands would take place and the wood products potential of Afognak Island would thus be greatly reduced, as would its potential impact on the economy of the Kodiak area.

Cattle Industry: Cattle ranching has been a minor element in the economy of Kodiak Island for a number of years. Currently, there are 6 or 7 ranches on the island on lands leased from the Bureau of Land Management, which support a total of about 2,000 cattle. An approved slaughterhouse facility at Woman's Bay about 16 kilometers (10 mi) south of Kodiak is cooperatively owned by Kodiak ranchers and was financed by State revolving loan funds. Although this slaughterhouse could probably accommodate several thousand animals, only between 30 and 300 head are slaughtered annually. Carcasses are normally sold locally on Kodiak Island, although some are occasionally shipped to Anchorage.

The potential for major expansion of cattle ranching on Kodiak Island appears very limited, at least in the short term.

Local Government Finances: Kodiak's most recent audit was reviewed as were operating revenue sources for the Kodiak Island Borough school district. In addition, data developed by the State Assessor on property valuation, local tax rates, and per capita debt were analyzed.

A review of the full value of property, as determined by the State Assessor (Alaska Taxable) within Kodiak's corporate limits and the Kodiak Island Borough boundaries from 1969 through 1977 was undertaken (table III.C.2.b.-4). According to the State Assessor's records, the full value of property in the city of Kodiak increased 221.4 percent during this period, while that for the borough as a whole rose a slightly lower 189.2 percent. The city accounted for 73

Table III.C.2.b.-4
City of Kodiak and Kodiak Island Borough
Comparison of Full Value Determination
1976 - 1977

(in $000's to nearest $1,000)

Year	City of Kodiak	Total Kodiak Island Borough
1969	$ 44,118	$ 60,399
1970	$ 40,749	$ 57,751
1971	$ 51,092	$ 70,069
1972	$ 52,905	$ 75,956
1973	$ 53,729	$ 75,323
1974	$ 72,616	$ 96,246
1975	$ 80,284	$ 112,324
1976	$ 110,316	$ 145,764
1977	$ 141,802	$ 174,702

Source: Alaska Consultants, Inc., 1979. Table 105, p. 516.

percent of the full value of property in the borough in 1969, whereas, in 1977, the city's share had risen to 81.2 percent of total property valuation. Growth in the city's property valuation has generally been more rapid since 1973, with most of this growth believed to have been derived from the continued expansion of the area's fishing and fish processing industry which is heavily concentrated within Kodiak's corporate limits.

A review of local and areawide property mil and sales tax rates applicable to Kodiak since the 1972-73 fiscal year (table III.C.2.b.-5) and a comparison of these rates with those of other Alaska municipalities indicates that, given the level of service provided, residents of the city of Kodiak are taxed at a rate which compares favorably with that of most other urban areas in the State. In 1977-78, property tax rates for the city of Kodiak were set at 16.33 mils, the same as for the previous year. Of this assessment, 9.10 mils were remitted to the city and the remainder was retained by the borough for administration (2 mils) and schools (5.23 mils). For the current fiscal year, the mil rate has been set at 16 mils, with the city share remaining the same and the borough assessment for schools dropping slightly to 5 mils.

The Kodiak Island Borough does not levy a sales tax. However, a 3-percent sales tax levied by the city of Kodiak is collected by the borough and remitted to the city. A portion of these revenues is remitted to the borough by the city in lieu of personal property taxes which are levied throughout the borough, except within Kodiak's corporate boundaries.

An analysis of the city of Kodiak's general fund revenues and expenditures for the fiscal year ended June 30, 1977, (table III.C.2.b.-6) was undertaken. A very high proportion (close to 80%) of Kodiak's general fund revenues is derived from local sources. Total general fund revenues for FY 1977 amounted to $3,458,977. Of this, by far the greatest share (52%) was derived from taxes, with sales taxes alone accounting for 35.8 percent of all general fund revenues, followed by property taxes (15.8%) plus a minor amount collected in the form of penalties and interest on delinquent taxes. Aside from taxes, other major sources of general fund revenues for the city of Kodiak in FY 1977 were inter-fund receipts (23% of the total) and intergovernmental revenues (12.3%).

Although Kodiak's general government revenues are primarily derived from locally generated funds, this is not the case with education services provided by the Kodiak Island Borough. According to figures provided by the Alaska Department of Education approximately 91 percent of total operating revenue sources for the borough school system in FY 1977 came from State sources, compared with slightly less than 8 percent from local (borough) revenues.

A look at Kodiak's general fund expenditures in table III.C.2.b.-7 for the year ended June 30, 1977, indicates that the largest single area of expenditure, accounting for 34.8 percent of the total, was in a category described as nondepartmental charges divided among miscellaneous (most of which was taken up in lieu of tax payments to the borough but with insurance and utilities payments also significant) debt service and inter-fund transfer (primarily from the water utility and HUD block grant funds) line items. Other major areas for city expenditures in FY 1977 were public safety (27.2% of total general fund expenditures), public works (20.3%), and general government (10.4%).

Table III.C.2.b.-5
City of Kodiak and Kodiak Island Borough
1972/73 - 1977/78

	Property Tax (mils)					
	1972/73	1973/74	1974/75	1975/76	1976/77	1977/78
City	8.20	8.60	8.60	8.60	9.10	9.10
Borough Admistration	.40	.40	1.62	2.50	2.00	2.00
Borough Schools	4.48	4.48	4.24	3.30	5.23	5.23
TOTAL	13.08	13.48	14.46	14.40	16.33	16.33

	City Sales Tax (percent)					
	1972/73	1973/74	1974/75	1975/76	1976/77	1977/78
Administration	3.00	3.00	3.00	3.00	3.00	3.00
TOTAL	3.00	3.00	3.00	3.00	3.00	3.00

Source: Alaska Consultants, Inc., 1979. Table 106, p. 518.

Table III.C.2.b.-6
General Fund
Statement of Expenditures and Encumbrances
City of Kodiak
For the Year Ended June 30, 1977

	Expenditures and Encumbrances
General Government:	
Legislative	$ 10,353
Legal	53,955
Executive	39,914
Clerk	63,012
Finance	163,772
Total General Government	$ 331,006
Public Safety:	
Police Department	$ 618,148
Fire Department	247,969
Total Public Safety	$ 866,117
Public Works:	
City Engineer	$ 107,693
Administration and Buildings	84,023
Utilities	131,658
Streets and Snow Removal	232,607
Garage	90,973
Total Public Works	$ 646,954
Parks and Recreation	$ 104,257
Museum	$ 13,695
Library	$ 114,868
Non-Departmental Charges:	
Miscellaneous	$ 582,690
Debt Service	139,440
Transfers	384,021
Total Non-Departmental Charges	$1,106,151
	$3,183,048

Source: Alaska Consultants, Inc., 1979. Table 107, p. 520.

Table III.C.2.b.-7
Types of Village Employment
Koniag Region

	Total Labor Force	Summer Employment		Year-round Employment		Nine-month Employment	
Akhiok	40	32	80%	5	12%	3	7%
Karluk	31	20	64%	5	16%	3	19%
Larsen Bay	52	100	100%	6	11.5%	6	11.5%
Old Harbor	190	100	100%	13	7%	31	16%
Ouzinkie	64	55	86%	6	9%	3	5%
Port Lions	166	52	31.3%	26	15.7%	88	53%

Source: Kodiak Island 5-Year Health Plan (1979).

A review of Kodiak's overall financial condition indicates that the city's financial position is generally sound. According to the State Assessor's records, the city has a higher per capita property valuation compared with most other Alaska communities.

In addition to outstanding general obligation bonds, Kodiak also has a total of $5,093,000 in revenue bonds outstanding as of June 30, 1977. While these are a long-term financial obligation of the city, they are not classed as a debt since their repayment is theoretically covered by incoming revenues.

Village Economies: Table III.C.2.b.-7 is a detailed summary of types of employment within the Koniag Region Villages. Refer to section III.C.1. for further information regarding Kodiak Island villages.

The six villages on Kodiak Island lack stabilized employment opportunities. The majority of the village residents are still dependent upon salmon fishing during the summer months. With the exception of a couple of villages, it appears that village residents will not move toward diversified fisheries, crab, shrimp, etc., for sometime due to lack of capital to purchase larger boats as a result of the decline of salmon runs. Lack of water and sewage treatment facilities also contributes to the limited economic base. Boat harbors are non-existent as are airports.

Primarily, the bulk of the people living within the villages in the Koniag Region are employed in the fisheries industry. They are employed in the harvest phase as fishermen or in the processing phase as cannery or cold storage workers. The employment is highly seasonal and competitive, due to the economic conditions in the continental United States forcing people to find work away from their homes (college students seeking summer employment) and the fact that the fisheries have in the past years been over-harvested.

In the past years, fishing limitations have been imposed and harvesting has only been allowed 2 or 3 days per week during the summer fishing season. The Koniag Region does have fledgling tourist and forestry industries--neither of these industries employs a significant number of Alaska Natives. As a result of the above conditions, the greatest bulk of the people, particularly in the villages, are employed only for a few weeks out of each year and compensation they receive for their work only allows for meager existence.

The overall unemployment rate for the service area has been 9.6 percent for the past 2 years. This high unemployment is due to the fisheries industry, which is totally seasonal. In support of this fact, the 1974 borough census reports a total of 282 individuals employed in the private sector. An additional 27 individuals are employed by State, Federal, and local government programs. The average income for a family of four in the villages ranges from $3,000 to $6,000 annually.

The greatest employment needs in the service area includes legal services, health and educational services, administrative services, secretarial, bookkeeping, and public service.

A summary of the reliance upon subsistence is presented in table III.C.2.b.-8. Refer to section III.C.1.d. for more information regarding subsistence.

Table III.C.2.b.-8
Reliance Upon Subsistence

The lifestyle of the coastline area depends on a subsistence way of life. The subsistenc
species consist of: salmon, crab, shrimp, clams, deer, rabbits, ducks, seal, and ptarmi

	Akhiok	Karluk	Larsen Bay	Old Harbor	Ouzinkie	Port Lio
Percentage of dependence on subsistence	60%	80%	53%	*	**	60%

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* No figures available, but a significant dependence on subsistence.
** Heavy dependence on subsistence.

Source: Kodiak Area Native Association, CETA Title VI - Public Service Employment Proposal, July 1977.

b. Local Economy - 2, Kenai Census Division: The analysis of the Kenai-Cook Inlet Census Division below is taken from Alaska Consultants, Inc. (1980). The economic base of the Kenai-Cook Inlet Census Division of the Kenai Peninsula Borough is built primarily upon the oil and gas industry, fishing and fish processing, and the tourism and recreational industries. Over the past two decades, the expansion of these basic industries has greatly broadened the region's economic base, although the course of expansion has not been smooth. In particular, the labor intensive character of the construction of key industrial facilities has made the Kenai-Nikiski area prone to repeated boom-bust cycles through successive stages of economic expansion.

Between 1970 and 1977, Alaska Department of Labor nonagricultural wage and salary employment data indicate that employment in the Kenai-Cook Inlet Labor Area doubled from 3,640 to 7,332. Within the Kenai-Cook Inlet Labor Area, the Department of Labor collects insured employment data for local subareas, three of which (the Kenai labor area, the Soldotna labor area, and the Homer labor area) are important for this baseline analysis.

Over recent years, the geographic distribution of employment in the region has become steadily more concentrated in the Kenai-Nikiski industrial area.

Composition of Employment: The composition of employment in the Kenai-Cook Inlet Census Division reflects the strong role that the oil and gas industry, petrochemicals, and fish processing play in the region's economic base. In 1977, the most recent year for which complete nonagricultural wage and salary employment data are available, about 721 jobs or 9.8 percent of the total were in mining, mostly in oil and gas extraction; and another 1,015 jobs or 13.5 percent were in the maufacturing sector. For comparison, mining provided only 3.0 percent of statewide employment and maufacturing only 6.6 percent. Thus, the prominence of extractive and manufacturing activities lends a decidedly industrial quality to the Kenai-Cook Inlet region's economy which is uncharacteristic of most regions in the state.

The largest single economic sector in 1977 was contract construction, in which 1,808 jobs, or 24.7 percent of total nonagricultural wage and salary employment here were reported. However, 1977 set an all-time high for construction activity in the region as the Union Oil Company's Collier Carbon and Chemical Corporation's ammonia-urea plant, Alaska's first and largest petrochemical plant, undertook a major expansion program during this period. Other private and public construction activities were also abnormally high. As a result, the 1977 job level was not at all representative of historic or expected future levels of employment in the region's construction industry. For example, data for the first three quarters of 1978 show that average monthly employment in contract construction fell to 481 jobs or about one quarter of the previous year's average. This precipitous decline in construction employment upon completion of a major project is typical of the pattern of boom-bust cycles to which the region's economy has proven susceptible.

The exaggerated expansion-contraction cycle and the high job turnover it causes is probably an important factor in the high unemployment rate which has afflicted the region, without regard for permanent employment gains. Thus, in 1978, the unemployment rate was substantially higher than in 1970.

Within the recent timeframe of 1977-78, spanning the construction of the addition to the Union Oil Company petrochemical plant, available economic dat reveals a sharp recessionary trend. This trend is evident in the parallel movements of employment levels and payrolls. In the six months between the third quarter peak of 1977 and the first quarter of 1978, employment declined by 31 percent from 8,370 jobs to 5,789. As might be expected, the bulk of this decline took place in the construction sector which fell from 2,243 jobs to 364, a decline of 84 percent.

Sector Analysis: The Cook Inlet commercial fishery can be dated back to the late 1800's and for many years fishing was the chief basic industry for the small coastal towns of the western Kenai Peninsula. That changed after the mid-1950's. First the completion of the Sterling Highway opened the area's varied recreational assets to Anchorage area residents. Then, the discovery of commercial oil and gas resources in the Cook Inlet Basin transformed the Kenai-Nikiski area into the center of a major oil and gas producing and processing industry.

As the process of economic diversification progressed, a definite geographic differentiation in economic functions among the main towns in the western peninsula has evolved. The City of Kenai and its neighboring Nikiski-North Kenai area have become the heart of oil and gas related industries and a center of trade and commerce for the western peninsula. Soldotna, the seat of the Kenai Peninsula Borough, has become the center for government and educational services, as well as a bedroom community for other employment centers within the commuting distance. In the lower Cook Inlet area, Homer and Seldov have remained strongly tied to the fishing industry, with Homer also becoming a popular destination for recreational visitors and tourists.

Oil and Gas: When the Richfield Oil Corporation discovered natural gas in the Swanson River area in 1957, the Kenai area was launched upon the path to its singular role as the center of Alaska's oil and gas industry. The Prudhoe Bay fields now produce far more oil and have far greater natural gas reserves than the Cook Inlet Basin. The Valdez terminal for the trans-Alaska pipeline ships more crude oil and Anchorage has become the managerial headquarters for the oil industry in Alaska and for its counterpart governmental bureaucracy. But no region of Alaska has achieved the diversity of oil- and gas-related development that the Kenai-Nikiski area has attained.

The Kenai oil and gas region has grown to become the focus of a mature oil and gas industrial complex. It hosts a full range of oil field service and supply industries. It is at the heart of a far-flung network of pipelines for collection of crude oil and natural gas production. It harbors treatment facilities, refineries, a petrochemical plant, an LNG plant and marine facilities for transfer of crude oil and LNG and for support of offshore oil operations. It is the source of product pipelines to Anchorage area utilities and consumers of Cook Inlet hydrocarbon energy production.

In short, the Kenai vicinity possesses a representative array of oil and gas industrial facilities. The cumulative production of hydrocarbons in the Cook Inlet basin through 1976 amounted to 755 MMbbls of oil, over 2 Bcf of casinghead and dry gas and over 5 MMbbls of natural gas liquids. Annual oil production peaked in 1970 at 84 MMbbls. Annual natural gas production first exceeded 200 MMcf in 1970 and has continued to rise, attaining a new peak in 1976 of

271 MMcf. Despite the decline in oil production, the oil and gas industry and federal and state landlords are optimistic that the Kenai region still has a solid future in production and processing of oil and gas reserves imputed to tracts recently leased and to those anticipated to be soon leased for exploration.

Since 1957, the Kenai-Cook Inlet area's economy has moved in response to oil and gas development decisions. Development and production of the onshore and offshore oil and gas fields represented, of course, a major addition to the region's previously slight economic base. However, far more consequential than mere oil and gas production was a series of entrepreneurial choices about product processing and marketing that fostered Kenai's emergence as an industrial center.

In the case of oil, the significant choice was the decision to retain some crude oil for refinement into products for Alaskan markets. In the case of natural gas, it was the decision to convert gas in excess of the region's needs into exportable products. The outcome of these choices led to the construction of four major industrial plants in the Nikiski area in a brief few years. The construction of these plants and subsequent plant additions imposed on Kenai the cycle of boom growth and faltering readjustment that it has repeatedly undergone in the past 15 years.

The first major hydrocarbon facility to be completed was the SOCAL (now Chevron) oil refinery completed in 1963 at Nikiski. This plant produced asphalt, heating, and diesel oil, jet fuels, and other products for Alaska consumption, with a processing capacity of 22,000 barrels of oil per day. At present, the plant has 21 full-time employees.

The Drift River crude oil storage and loading facility on the west shore of Cook Inlet was completed in 1967, along with oil treatment facilities at Trading Bay and a network of gathering pipelines and stations. These facilities collect offshore production for export. The Drift River terminal currently employs about 17 workers and the Trading Bay treatment facility about 60 persons. Because these facilities are at remote sites on the west shore, their construction and operation have had relatively little direct impact on the Kenai area.

Limited amounts of Cook Inlet basin natural gas production are consumed in the region for power production and other purposes. However, natural gas production potential is far in excess of Southcentral Alaska demand. Since the remoteness and scale of the Cook Inlet gas fields precluded the economic feasibility of delivery to markets by a conventional pipeline, producing companies adopted two other alternatives for realizing the economic value of Cook Inlet gas finds. The Collier Carbon and Chemical Corporation, a subsidiary of Union Oil Company, built a petrochemical complex designed to use natural gas to manufacture ammonia-urea fertilizers which, unlike natural gas, could be economically transported in bulk carriers to distant markets. Phillips Petroleum Company and Marathon Oil Company, on the other hand, jointly built and operate a plant to liquefy natural gas for shipment by LNG tanker to Japan.

Upon its completion in 1968, the Collier ammonia-urea plant at Nikiski was Alaska's largest petrochemical plant and one of the largest of its type in the world. In 1977, two additional plants units were added which doubled the plant's capacity and employment. The facility now is able to produce 725,624 metric tons (800,000 tons) of urea and 997,732 metric tons (1,100,000 tons) of ammonia fertilizers annually. Reportedly, most of the output is destined for West Coast markets. The plant now has about 315 full-time employees.

The Phillips-Marathon LNG plant was built and on stream by 1969. This plant liquefies natural gas by chilling it to -162°C (-260°F). Liquefaction reduces the product volume by a factor of 600. The liquefied natural gas is then shipped by specially designed LNG carriers to Japan. Plant operation employs 41 persons.

Also completed in 1969 was the Tesoro-Alaska refinery. This plant has a capacity of 45,000 barrels a day and produces gasoline, diesel oil, jet fuels, and a variety of other end products for Alaska consumption. Its current employment is 48 persons.

Cumulatively, the above industrial facilities directly account for over 500 permanent, non-seasonal manufacturing jobs in the Kenai-Cook Inlet region, mostly in the Nikiski area. This does not include employment in oil and gas exploration, development and production activities. As of 1978, these activities accounted for an estimated further 750-800 jobs in the region in the mining sector. This is up by about one hundred jobs over 1977, possibly due to new offshore exploration efforts following the federal Lower Cook Inlet OCS lease sale in October 1977. The first exploratory well in that lease area was spudded in July 1978 by Marathon Oil Company's drill ship, Diamond M. Dragon on the premier tract for which Marathon and its partners bid $77 million. That well has since been abandoned as a dry hole but a number of additional wells have been started or are in the planning stage.

Oil field service and supply industries also contribute a significant share of employment to the transportation, service and other economic sectors. A review of telephone listings for the Kenai-Nikiski-North Kenai-Soldotna area indicates that there are between 65 to 75 local firms engaged in a wide range of oil and gas industry support functions, but there is no count of the number of individuals these firms employ.

Fishing and Fish Processing: See graphics 3 through 8 and discussions on the back of graphics 5 through 8 for details regarding this subject.

Tourism and Recreation: After oil and gas and fishing and fish processing, the tourism and recreation industry has grown to be, the most important component of the Kenai-Cook Inlet region's economic base. The coastal strip of the western Kenai Peninsula between Kenai and Homer is reported by the Alaska Department of Natural Resources, Division of Parks, to be the most intensively used outdoor recreational area in the state. Refer to section III.C.4. for a more detailed description of the area's recreation resources.

The economic impact of the visitor industry is highly concentrated at Homer on the Homer Spit and, also at Kenai, the point of access to the recreational areas of the northwest section of the peninsula. Otherwise, the economic impact is scattered at points along the Sterling Highway where service stations, road houses, and other highway oriented businesses catering to visitors are located. These local commercial impacts can be distinguished from the recreational user impacts which tend to concentrate at public campgrounds, clamming beaches, creeksides, lake fronts, trails, and other points or corridors with exceptional public recreational value. Only at certain spots, as on the intensely used Homer Spit, do the focus of recreational activity and commercial impact coincide.

Although the specific findings of past surveys differ, they are consistent in the theme that the primary pursuit of visitors to the Kenai Peninsula is an outdoor recreational experience of a sort that does not entail, and may even be adverse to, expenditure of large sums for local goods and services.

Regardless of average expenditures, the volume of visitors to the Kenai is such that its quantitative contribution to trade and services in the region's basic economy is impressive. According to a 1972 study of the economic impact of visitors published by the OEDP Committee, a sample survey of businessmen estimated that the visitor industry accounted for about 31 percent of all retail trade in the Kenai Peninsula. If this is accepted as a valid ratio, a rough estimate might be that about 582 of the average annual figure of 1,876 persons employed in trade and services in the Kenai-Cook Inlet area in 1977 could be attributed to the visitor industry.

Another important feature of the visitor industry in the Kenai Peninsula is that it is highly seasonal. Since outdoor recreational activities are the prime attraction, summer is the time of peak activity. This seasonal cycle comes through clearly in employment data for the Homer Labor Area, the area proportionately most impacted by the visitor industry. Trade and services are the two economic sectors which best show the effect of the visitor industry. In 1978, Homer area employment in trade in the high summer was 50 percent above the low winter month; in the services industry, the spread was nearly 150 percent. Besides the seasonal cycle, summertime visitor traffic from the Anchorage area is heavily skewed toward weekends, when people are most often free for recreational pursuits.

Other: Apart from the oil and gas, fishing and fish processing, and visitor industries, a variety of other economic activities make minor contributions to the Kenai-Cook Inlet area's basic economy.

In the years since the western Peninsula was made accessible by the completion of the Sterling Highway, the agricultural potential of the region has been tested by extensive homesteading. While there are tracts which are physically suitable for agriculture and livestock, particularly in the Homer area, economic conditions have not proven favorable enough to promote any extensive agricultural development. Also, the economic feasibility of agricultural enterprises has been adversely affected by the effect of competing uses on land values and land use patterns. Consequently, agriculture has remained a marginal economic endeavor and can perhaps most realistically be considered as a transitional land use.

The timber resources of the Kenai-Cook Inlet area are currently supporting a commercial harvest. The major milling operations are at Tyonek on the west shore of Cook Inlet and at Jakolof Bay on the south side of Kachemak Bay. (However, most timber processed at Jakolof Bay presently comes from Icy Bay, outside the Kenai Peninsula Borough region.) Small mills are also in occasional operation at Soldotna, Anchor Point, and Homer producing sawtimber for local use. Of the three latter towns, Homer is best situated to serve as a yarding, milling, and shipping point for wood products. However, the potential competition for space, especially for waterfront industrial use, and available labor between the wood products industry and the economically more important fishing industry, have inclined the city of Homer to downplay development of a local wood products industry in favor of continued emphasis on fisheries development and the visitor industry.

Until the early 1970's, the military was a significant element in the population and economy of the city of Kenai vicinity. As of 1970, there were 750 military personnel, including dependents, stationed at Wildwood Station, just north of the city. However, now that the station has been closed and the facilities transferred to the Kenai Native Association, the economic role of the military is negligible.

c. Local Kenai, North Kenai Economy:

Employment: In 1970, the Kenai labor area which includes Nikishka, Nikiski, Red Mountain, Swanson River, and Wildwood Station was already the primary employment center in the Kenai-Cook Inlet region with 47.3 percent of the region's total employment. The Kenai labor area has since become increasingly dominant. By 1977, it provided 56.6 percent of the region's jobs.

Because of the impact of two large industrial construction projects in the Nikiski area, 1977 was not a "typical" employment year for the Kenai labor area. Indeed, no single year can be typical in such a volatile local economy. Nevertheless, the 1977 data do illustrate to an exaggerated degree the distinctive features of the local and regional economy. It was previously noted that the construction, mining, and manufacturing sectors employ a larger share of the work force in the Kenai-Cook Inlet region than they do in the state as a whole. In the smaller Kenai labor area, a subunit of the Kenai-Cook Inlet Census Division, the concentration of employment in these three sectors was even more intense. In 1977, the Kenai labor area provided 84.9 percent of the region's mining employment and 84.3 percent of its construction employment.

Within the Kenai labor area, these same three sectors, construction (37.0%), mining (14.7%), and manufacturing (14.2%) accounted for almost two-thirds of total insured employment in 1977 (table III.C.2.c.-1). On the other hand, there was an unusually low percentage of government workers (9.1%) and transportation, communications, and public utilities employees (5.0%). Keeping in mind that the Kenai labor area's 1977 employment pattern was highly distorted by heavy industrial construction, the 1977 data reflect the extraordinary impact upon the local workforce of periodic industrial development projects, a tendency which will continue until the area's employment base becomes larger and more diverse.

The Anchorage Urban Observatory conducted a sample survey of adult employment by economic sector in the city of Kenai (table III.C.2.c.-2). A comparison of these figures with 1976 Department of Labor employment data for the entire Kenai labor area, suggests that employment patterns in the city of Kenai are not radically different from the Kenai labor area as a whole, including the unincorporated North Kenai area to the north of the city.

Since many commercial fishermen are self-employed persons, nonagricultural wage and salary employment data published by the Alaska Department of Labor

Table III.C.2.c.-1
Nonagricultural Wage and Salary Employment Distribution
Kenai Labor Area 1/
1970-1977

	1970		1977		1970-1977
	Number	%	Number	%	% Change
Agriculture, Forestry, and Fisheries	2/		2/		
Mining	455	26.4	612	14.7	34.5
Contract Construction	282	16.4	1,535	37.0	444.3
Manufacturing	271	15.7	588	14.2	117.0
Transportation, Communications and Public Utilities	134	7.8	206	5.0	53.7
Trade	271	15.7	584	14.1	115.5
Finance, Insurance, and Real Estate	46	2.7	92	2.2	100.0
Service	190	11.0	430	10.4	126.3
Miscellaneous	0		2/		
Government	70	4.1	2/		
Federal	2/		2/		
State & Local	2/		2/		
TOTAL	1,723	100.0	4,150	100.0	140.9

1/ Includes Nikishka, Nikiski, Red Mountain, Swanson River, and Wildwood Station.

2/ Employment figures withheld to comply with disclosure regulations.

Source: Alaska Consultants, Inc., 1980. Table 7, p. 24.

Table III.C.2.c.-2
Distribution of Total Adult Employment By Economic Sector City of Kenai 1976

	Percent
Agriculture and Commercial Fishing	4.2
Mining, Oil and Gas Production	20.5
Construction	14.0
Manufacturing (lumber and fish processing, oil and gas refining)	11.6
Transportation, Communications, and Public Utilities	4.7
Wholesale, Retail Trade	10.7
Finance, Insurance, and Real Estate	1.9
Services: Medicine, Law, Hotel, etc.	16.3
Government	16.3
Other	--
TOTAL	100.0
N =	(215)

Source: Alaska Consultants, Inc., 1980. Table 31, p. 89.

fail to reflect fully the economic contribution of this industry. However, some indication of the extent to which Kenai area residents participate in the Cook Inlet commercial fishery can be obtained from the records of the Commercial Fisheries Entry Commission. Based upon the addresses given on permit applications, 272 persons resident in the Kenai-north Kenai area obtained a total of 309 commercial fishing permits in 1975. The number of permit holders does not include additional crew members on fishing boats and also because permit holders operating out of the Kenai-north Kenai area do not necessarily list this area as their residence. On the other hand, given the concentration on the salmon fishery in upper Cook Inlet, fishing is an extremely seasonal source of employment in this area. However, if the count of permit holders is accepted as approximately representing the number of active resident fishermen, then commercial fishermen increased the cited employment figures for the Kenai labor area in 1975 by about 10 percent.

In weighing the local importance of the commercial fisheries, it should be kept in mind that most (230 of 309) permits issued to Kenai area residents were for set nets (127) and drift nets (103) the small scale gear. Thus, the Kenai-based fishing industry is strongly oriented to the highly seasonal Cook Inlet commercial salmon fishery. In effect, commercial fishing is a part-time livelihood for many if not most participants, often supplemented by sources of income from other occupations.

Recent Trends and Changes: The Kenai labor area has effectively become the bellwether for economic trends in the Kenai-Cook Inlet Census Division. Following the Collier Carbon and Chemical Corporation's Plant expansion project in late 1977, the Kenai-north Kenai area (and the Kenai-Cook Inlet region) experienced a sudden steep slide in employment. In the Kenai labor area, employment fell from the 1977 annual average of 4,150 workers to an annual average of 3,169 over the first 9 months of 1978. It is important to note that this was not an across-the-board decline. It was almost solely attributable to the dropoff in construction employment from 1,525 jobs in 1977 to a mere 197 in 1978, an almost instantaneous loss of 1,338 jobs. Many of these construction workers undoubtedly left the Kenai-north Kenai area, while other economic sectors showed strength and took up some of the overall employment slack. Most notably, manufacturing employment rose significantly with the addition of new jobs at the Collier plant to the permanent local workforce. Mining employment has also risen recently, probably due to ongoing oil and gas exploration in the Cook Inlet basin following the Lower Cook Inlet OCS sale. Other sectors of the economy have been holding fairly steady after 1977, suggesting that the period of post-construction project adjustment is over and that the local economy has temporarily stabilized in wait for the next surge of growth.

Income Levels: Various income measures consistently indicate that employees in the Kenai labor area enjoy comparatively high incomes. As early as 1969, according to the U.S. Census, the mean household income in the city of Kenai was $15,927, well above the mark of $14,150 for the Kenai-Cook Inlet Census Division and $13,856 for the state as a whole. A more recent sample survey of household incomes conducted by the Anchorage Urban Observatory found that city of Kenai families had a mean income of $31,771 in 1975. This was highest of the five major cities (Kenai, Soldotna, Seldovia, Seward, and Homer) in the Kenai Peninsula Borough and was well above the boroughwide (excluding Homer) mean of $28,946.

Also tending to support the conclusion that family incomes are above average in the Kenai-north Kenai area is the finding that the Kenai labor area employment mix includes a high proportion of workers in the better paid industrial sectors of mining and construction.

Public assistance programs appear to make a minor, though critical, contribution to the economic well-being of some Kenai area residents. In the month of March 1979, the various public assistance programs administered by the Alaska Department of Health and Social Services paid a total of $33,024 to 129 aid recipients in Kenai, with the bulk of the cases and funds being in the Aid to Families with Dependent Children category. In addition, the Bureau of Indian Affairs' general assistance program, which is administered by the Cook Inlet Native Association in this area, distributed a total of $21,118 in assistance payments in 1978. Considering the high unemployment rates which prevail in the Kenai region, the amount of income provided through public assistance programs appears modest for a community of Kenai's size.

Local Government Finances: Fiscal data from the city of Kenai's financial report for the fiscal year ending June 20, 1978, and other municipal financial data compiled and published by the State Assessor's Office were analyzed to evaluate the city's financial circumstances.

Property taxes are the leading source of general fund revenues for the city of Kenai. Property tax revenue yields depend directly on the value of the local property tax base. The city's equalized assessed valuation was reported at $109,700,000 in 1978 (table III.C.2.c.-3). This represents an increase of 175 percent over the assessed valuation of 1969, with most of the increase occurring in the most recent 2 years. During the same decade-long period, Kenai population increased by about one-quarter, so the property tax base has grown at a much faster rate than population, although a good share of the rise in assessed value can be dismissed as merely reflecting inflation rather than a real increase.

The ratio of assessed valuation to population is a good index of the revenue capacity of a locality. As of 1978, the city of Kenai's valuation was reported as $20,451 per capita. This ratio is far below the statewide average of $50,398 per capita. However, if the extraordinary effect of the trans-Alaska pipeline and related property on a few local jurisdictions is taken into consideration, then Kenai's per capita valuation begins to approach the norm.

As of June 1978, the city of Kenai had outstanding general obligation bonds in the amount of $4,425,000 and total general obligation debt service requirements of $6,527,817 through 1998 (tables III.C.2.c.-4 and -5). In per capita terms, this equalled a direct general obligation debt to the city of $825 per person, a figure well below the statewide municipal average of $1,421. Not included in this figure, however, is the city of Kenai's share of the Kenai Peninsula Borough's bonded debt. Prorating to the city of Kenai a share of the Borough's debt proportionate to the city's share of the boroughwide property tax base adds an additional $3,397,223 to the debt burden effectively resting upon the city's property tax base.

Compared to nationwide debt ratio indexes for cities of its size, Kenai is within satisfactory limits. By the key index of the ratio of bonded debt to assessed valuation, Kenai, at 4.03 percent, is in a superior position to the

Table III.C.2.c.-3
City of Kenai
Comparison of Full Value Determination
1970 - 1978
(in $000's to nearest $1,000)

Year	Full Value Determination
1970	$ 48,179
1975	$ 54,687
1976	$ 62,934
1977	$ 85,178
1978	$109,700

Source: Alaska Consultants, Inc., 1980. Table 54, p. 162.

Table III.C.2.c.-4
Indicators of Financial Condition
City of Kenai, Alaska
FY 1978

Population	5,364[1]		
Full Value Determination		$109,699,805.00	
Full Value Per Capita		$ 20,451.00	
General Obligation Debt		$ 4,425,000.00	
Total Debt[2]		$ 7,822,223.00	
Per Capita Debt			
General Obligation		$ 825.00	
Total		$ 1,458.00	
Debt as Percent of Full Value			
General Obligation			4.03%
Total			7.13%

Guidelines for Per Capita Debt

Direct	$ 618.48	
Overall	$ 733.93	
Percent of Full Value[3]		5.50%

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[1] Kenai's July 1977 population as accepted by the Department of Community and Regional Affairs for State Revenue Sharing Purposes.

[2] Total debt equals Kenai's G.O. bonded debt plus a prorated share ($3,397,223) of the Kenai Peninsula Borough's G.O. bonded debt based on the city of Kenai's accounting for 7 percent of the borough's 1977 full value determination.

[3] Median value for selected places of under 10,000 population used by Moody's Investors Services, Inc.

Sources: Alaska Consultants, Inc., 1980. Table 55, p. 163.

Table III.C.2.c.-5
City of Kenai
General Bonded Debt
Schedule of Future Dept Service Requirements
JUNE 30, 1978

Fiscal Year	Principal	Interest	Total Requirement
1979	$ 280,000	$ 239,070	$ 519,070
1980	290,000	223,520	513,520
1981	295,000	207,382	512,382
1982	265,000	190,520	455,520
1983	215,000	177,875	392,875
1984	230,000	166,393	396,393
1985	235,000	154,070	389,070
1986	255,000	141,230	396,230
1987	265,000	127,350	392,350
1988	280,000	112,605	396,605
1989	300,000	96,838	396,838
1990	310,000	79,885	389,885
1991	310,000	61,975	371,975
1992	310,000	44,362	354,362
1993	195,000	26,212	221,212
1994	70,000	18,815	88,815
1995	75,000	14,973	89,973
1996	80,000	10,865	90,865
1997	80,000	6,625	86,625
1998	85,000	2,252	87,252
	$4,425,000	$2,102,817	$6,527,817

Source: Alaska Consultants, Inc., 1980. Table 56, p. 164.

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guidelines figure of 5.5 percent developed by Moody's Investors Service, Inc. for cities of under 10,000 population. However, if Kenai's share of the borough's debt included, the city has a less favorable 7.13 percent ratio of bonded debt to local assessed valuation. Nevertheless, the city's debt service capacity has improved substantially since 1976 when its local debt to valuation ratio was a very high 12.01 percent.

The city has also issued revenue bonds to finance its airport terminal building (outstanding balance of $467,500) and the Kenai City Light Utility (outstanding balance of $1,173,679), whose assets and debts were conveyed to the Homer Electric Association in August 1971.

The city's general fund expenditures in fiscal year 1978 amounted to $2,167,650 or better than $400 per resident. The major category of expense was public safety which commanded 39.8 percent of the budget, followed by general government (29.4%), public works (26.4%), and parks and recreation (4.4%). In Kenai's organizational structure, public safety includes both city police and fire protection services (table III.C.2.c.-6).

For general fund revenues, the City relies very heavily upon locally raised funds. The city property tax was the leading revenue contributor and provided 42.2 percent of general fund revenues. The city sales tax yielded 26.5 percent of revenues whild fees, licenses, and other miscellaneous sources provided 7.7 percent. Kenai obtained only 23.6 percent or less than a quarter of its operating revenues from intergovernmental transfers.

Property tax rates in the city of Kenai rose sharply between 1972 and 1975, from 7 to 16.75 mils, but have since declined slightly. The 1978 mil rate of 13.4 was about average for Kenai over this recent period and was in the middle of the range for cities in the Kenai Peninsula Borough. In additon to the city mil levy, the Kenai Peninsula Borough also assesses a 4.7 mil tax in the city for school support (4.035 mils), borough administration (0.465 mils), and hospitals (0.2 mils). It should be noted that boroughwide administration of the local public education system relieves the city of direct responsibility for one of the major fiscal and service burdens of local government. The city sales tax levy was 3 percent in 1978, with an added 2 percent collected by the borough and allocated to school support (table III.C.2.c.-7).

In the broad picture of local government finance in the Kenai Peninsula Borough, the city of Kenai is adversely affected by the peculiar geography of residents and high value properties in the Kenai-north Kenai area. Kenai is the largest city in the borough, in part because of its function as a bedroom community for employees of the industrial plants in the Nikiski area. However, its real property tax base consists mostly of relatively low-valued residential, commercial, and light industrial properties. Kenai is home to roughly 20 percent of the borough's residents but only about 7 percent of its property tax base. On the other hand, the less populous but heavily industrialized Nikiski-north Kenai area immediately adjacent to Kenai encompasses about 75 percent of the borough tax base, a difference of tenfold over the city of Kenai. In effect, the city of Kenai supports city services for residents who commute to the Nikiski industrial plants, but it does not have [illegible] base [illegible] Kenai's role as a residential community. In years past, the city of Kenai has pursued changes in State statutes which would entitle it to a share of property tax income from the nearby highly capitalized industrial plants, but its efforts have not yet met with success.

Table III.C.2.c.-6
General Fund
Statement of Revenues and Expenditures
City of Kenai
Year Ended June 30, 1978

Revenues	Actual
Real and Personal Property Taxes	$1,320,336
Sales Tax	828,054
Licenses and Permits	31,539
Intergovernmental Revenue	735,972
Charges for Services	31,199
Fires and Forfeits	17,607
Rents and Leases	22,589
Miscellaneous Revenue	44,720
Transfers from Other Funds	94,143
TOTAL REVENUES	$2,167,653

Expenditures	Expenditures
General Government	$ 637,429
Public Safety	863,399
Public Works	570,773
Parks and Recreation	96,052
Other	0
TOTAL EXPENDITURES	$2,167,653

Source: Alaska Consultants, Inc., 1980. Table 57, p. 167.

Table I-II.C.2.c.-7
City of Kenai
Property and Sales Tax Rates
FY 1977 - FY 1978

	Property Tax (mils)	
	1977	1978
City of Kenai	15.00	13.400
Borough - Administration		0.465
Borough - Schools	5.00	4.035
Borough - Hospitals (South)	0.20	0.200
TOTAL	20.20	18.100

	Sales Tax (percent)	
	1977	1978
City of Kenai	4.00	3.00
Borough - Schools	2.00	2.00
TOTAL	6.00	5.00

Source: Alaska Consultants, Inc., 1980. Table 58, p. 168.

Despite the city's above-noted imbalance of service burdens and revenue potential, the city of Kenai's general financial condition seems to have improved in the past few years. Mil rates, per capita debt, and the ratio of debt to assessed valuation have all declined while assessed valuation has climbed.

d. Local Soldotna Economy:

Employment: A 1979 employment count (Alaska Consultants, Inc., 1980) totalled 361 government sector employees in Soldotna. This included 293 borough, school district, and city of Soldotna employees; 58 State employees, most of whom were associated with the Kenai Peninsula Community College; and 10 Federal Government employees. It is assumed that government employment was a slightly lower 350 in 1977. The government sector is the largest single employer in Soldotna and represents about one-quarter of all the city's employment. In this respect Soldotna is closer to statewide norms than either the Kenai-Cook Inlet Census Division or the Kenai labor area where construction was the dominant sector in 1977.

State Department of Labor data indicate that, next to government employment, Soldotna is most heavily dependent upon the trade and service sectors. In 1977, the latest year for which complete data are available, trade (25.6%) and services (22.3%) accounted for 459 jobs or nearly half (47.9%) of insured employment. This is a much heavier concentration of employment in these two sectors than occurred in the state as a whole (33.9%) or the Kenai-Cook Inlet Census Division (25.6%) in 1977.

After government, trade, and services, most remaining employment in Soldotna is in transportation, communications and public utilities (20%), and construction (16.5%).

Recent Trends and Changes: The trend in employment in Soldotna during the past decade has been one of rapid growth. Employment rose from 374 in 1970 to 958 by 1977, an increase of 156 percent (table III.C.2.d.-1).

Due to non-disclosure regulations and changes in the reporting requirements for local government employment, published Department of Labor data do not fully reflect growth trends in the public sector. However, Department of Labor data, considered together with the 1978 Alaska Consultants, Inc. employment count, do support the conclusion that the government sector has grown to become the most important employer in Soldotna.

After government, the strongest growth occurred in the contract construction industry where employment expanded fivefold during the seven year period. Most of this growth took place from 1975 to 1977, concomitant with the Collier Carbon and Chemical Corporation's plant expansion and involved primarily residential development.

After construction, the most dynamic element of Soldotna's economy was the service sector where employment more than tripled from 1970 to 1977. While some of this increase undoubtedly resulted from tourism, it also reflects the growing importance of Soldotna as a regional service center.

Because of disclosure regulations, data on employment in the transportation, communications, and public utilities sector are not available for the early

Table III.C.2.d.-1
Nonagricultural Wage and Salary Employment Distribution
Soldotna Labor Area
1970-1977

	1970		1977		1970-1977
	Number	%	Number	%	% Change
Agriculture, Forestry, and Fisheries	0		0		
Mining	31	8.3	51	5.3	64.5
Contract Construction	23	6.1	158	16.5	587.0
Manufacturing	*/		*/		
Transportation, Communications and Public Utilities	*/		192	20.0	
Trade	135	36.1	245	28.6	81.5
Finance, Insurance, and Real Estate	*/		42	4.4	
Service	48	12.8	214	82.3	345.8
Miscellaneous	0		*/		
Government	17	4.5	*/		
Federal	(*/)		(*/)		
State & Local	(*/)		(*/)		
TOTAL	374	100.0	958	100.0	156.1

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*/ Employment figures withheld to comply with disclosure regulations.

Source: Alaska Consultants, Inc., 1980. p. 184.

years of the decade. However, employment in this sector rose from 62 in 1972 to 192 in 1977, an increase of 210 percent.

Discounting borough employees, Soldotna labor area employment appears to have undergone modest growth during the first three quarters of 1978, despite the decline in employment in the region as a whole during this period. Although employment in the construction and transportation, communications and public utilities sectors declined, gains in all other sectors of the economy, most notably in trade and services, more than made up for the loss.

Income Levels: Soldotna households enjoy higher incomes than those in most other Kenai Peninsula Borough communities. A survey conducted by the Anchorage Urban Observatory found that of the five major cities (Soldotna, Kenai, Seldovia, Homer, and Seward) in the borough, city of Soldotna households had a mean income of $29,659 in 1975, second only to Kenai. For the larger Soldotna area (including Sports Lake and Big Eddy Road), mean household incomes were a somewhat higher $30,870, but were still slightly lower than those in Kenai.

Local Government Finances: In order to evaluate the fiscal condition of the city of Soldotna, the most recent city financial statement for the fiscal year ending June 30, 1978, was reviewed, along with data on assessed valuations, municipal debt and real property, and sales tax rates published by the State Assessor's Office.

A review of the full value of property, as determined by the State Assessor (Alaska Taxable), within Soldotna's corporate limits from 1969 through 1978 was undertaken (table III.C.2.d.-2). According to the State Assessor's records, the full value of property in Soldotna increased by about 414 percent during this period, with most of the increase occurring since 1976. This was a more rapid rate of growth than was experienced in other incorporated communities in the borough with the exception of Homer. However, the full value of property in the borough as a whole increased at a faster rate than in Soldotna during the same period, with the largest share of growth in valuation taking place outside the borough's incorporated communities, primarily due to oil and gas-related construction activity in the north Kenai area.

Total general fund revenues for Soldotna in FY 1978 amounted to $1,605,664. Of this, almost 60 percent was derived from property and local sales taxes. State revenue sharing funds were also significant, accounting for about 8 percent of Soldotna's general fund revenues in FY 1978.

The city's general fund expenditures in FY 1978 amounted to $1,365,716, or about $575 per capita. The major category of expense was the Police Department which accounted for 20.6 percent of general fund expenditures followed by administration (14.1%), streets and roads (10.8%), the city shop (9.5%), and the fire department (9.2%) (table III.C.2.d.-3).

A review of Soldotna's overall financial condition indicates that the city's financial position is basically sound but, in order to maintain this position, Soldotna residents have had to pay relatively high property and sales taxes. In the Kenai-Soldotna area, this is due in large part to the location of the Nikiski industrial area in north Kenai, outside the corporate limits of these communities although many workers live in either Kenai or Soldotna and use municipal facilities and services.

Table III.C.2.d.-2
City of Soldotna
Comparison of Full Value Determination
1970 - 1978

(in $000's to nearest $1,000)

Year	Full Value Determination
1969	$13,330
1970	$14,217
1971	$14,761
1972	$16,495
1973	$18,085
1974	$19,658
1975	$22,841
1976	$30,948
1977	$43,356
1978	$68,502

Source: Alaska Consultants, Inc., 1980. Table 74, p. 228.

Table III.C.2.d.-3
General Fund
Statement of Revenues and Expenditures
City of Soldotna
Year Ended June 30, 1978

Revenues	Revenues Actual
Property Tax	$ 459,801
Sales Taxes	488,415
Franchises	6,409
Licenses and Building Permits	37,451
Airport Income	18,867
Shared Revenue - State	131,472
Anit-recessionary	63,129
Transfer from Federal Revenue Sharing Fund	53,250
Business Licenses	89,580
Liquor Licenses	4,875
Telephone and Electric Cooperative	10,799
Amusement Devices	714
Fines	9,858
Park Fees	5,881
Charges for Services	12,407
Rental of Municipal Property	18,053
Shop Revenue and Equipment Rental	73,148
Motor Vehicle License Commission	23,058
Dispatch Revenue	20,700
Interest Earned	19,197
Sale of Municipal Property	5,735
Airport Gas Tax	3,248
Bureau of Outdoor Recreation	
Animal Control	1,182
CETA	17,636
Transfer from Capital Projects	25,495
Miscellaneous Revenue	5,304
TOTAL REVENUES	$ 1,605,664

Source: Alaska Consultants, Inc., 1980. Table 76, p. 232.

According to the State Assessor's records, Soldotna's per capita valuation was $28,965 per capita in FY 1978 (table III.C.2.d.-4). This was well below the statewide per capita valuation of $50,398 for that year. However, the statewide average was seriously distorted by the inclusion of the trans-Alaska pipeline and related taxable real property and Soldotna's per capita valuation exceeded that of most Alaska communities of a similar size.

As reported by the State Assessor, the city of Soldotna had an outstanding general obligation bonded indebtedness of $1,579,000 as of June 1978 (table III.C.2.d.-4). Nearly all of this debt is serviced through various special assessment funds established for specific public improvements rather than through general property tax revenues or general fund expenditures. The direct per capita debt averaged $668, which was well below the statewide municipal average ($1,421) but slightly above the average used by Moody's Investors Services. Not included in Soldotna's direct debt, however, is its share of the Kenai Peninsula Borough's general bonded indebtedness. Using a prorated share of the Kenai Peninsula Borough's general bonded debt based on the city of Soldotna's accounting for 4.4 percent of the borough's 1978 full value determination, a $2,135,398 indirect debt has been added to the city's general bonded debt to arrive at a total debt of $3,714,398. This total debt figure translates into a much larger per capita debt of $1,571 which is above the 1978 statewide municipal average and significantly exceeds the guidelines used by Moody's Investors Services. It also exceeds that of all other Kenai Peninsula Borough communities except Homer. Nevertheless, Soldotna's overall debt in terms of percentage of full value (5.4%) is within Moody's Investors Services' recommended guidelines (5.5%).

e. Local Homer Economy:

Composition of Employment: The 1978 Special Census counted 2,054 residents in the city of Homer. Another 3,027 persons lived at Anchor Point, Diamond Ridge, Fritz Creek, and Kachemak, which comprise the rest of the Homer labor area. Thus, nearly 60 percent of the residents of the Homer labor area appear to live in the surrounding area outside the city of Homer proper. Still, Homer itself is the focus of most employment in this area and, therefore, it is assumed that labor area data area fairly representative of Homer's own employment structure.

A field survey found that the fishing industry was the largest single employer here in 1979 (Alaska Consultants, Inc., 1980). Commercial fishing accounted for about 400 direct jobs or about one-quarter of the total of 1,621 jobs tallied. Since the Homer-based fishery is essentially an export industry sending its products outside the region, nearly all fishermen can be considered basic workers, making the fishing industry the source of nearly half of all basic employment.

This survey's count of the number of fishermen in the Homer area was checked against permit application data compiled by the Commercial Fisheries Entry Commission. In 1975, Commission records show that 196 permit applicants had a Homer mailing address and another 95 had an Anchor Point address. If allowance is made for a likely excess in the actual number of fishermen over the number of gear permits issued, this measure of fishing employment is broadly consistent with the results of the 1979 field survey.

Table III.C.2.d.-4
Indicators of Financial Condition
City of Soldotna, Alaska
FY 1978

Population[1]	2,365		
Full Value Determination		$68,502,128.00	
Full Value Per Capita		$ 28,965.00	
General Obligation Debt		$ 1,579,000.00	
Total Debt[2]		$ 3,714,398.00	
Per Capita Debt			
General Obligation		$ 668.00	
Total		$ 1,571.00	
Debt as Percent of Full Value			
General Obligation			2.31%
Total			5.42%

Guidelines for Per Capita Debt

Direct	$ 618.48	
Overall	$ 733.93	
Percent of Full Value[3]		5.50%

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[1] Soldotna's July 1977 population as accepted by the Department of Community and Regional Affairs for State Revenue Sharing Purposes.

[2] Total debt equals Soldotna's G.O. bonded debt plus a prorated share ($2,135,398) of the Kenai Peninsula Borough's G.O. bonded debt based on the city of Soldotna's accounting for 4.4 percent of the borough's 1978 full value determination.

[3] Median value for selected places of under 10,000 population used by Moody's Investors Services, Inc.

Source: Alaska Consultants, Inc., 1980. Table 77, p. 234.

Department of Labor employment data indiçate that, omitting direct employment in the fishing industry, the Homer area is heavily dependent upon the trade and service sectors for employment. In 1977, the most recent year for which complete data are available, trade (21.9%) and services (14.4%) together accounted for 267 jobs or better than one-third of insured employment. In part, this reflects the strong contribution of the tourism and recreation industry to Homer's economy. For example, the Alaska Consultants, Inc. survey found that between a quarter and a third of trade and service jobs were basic, catering to tourists and other visitors rather than to strictly local markets.

The industrial sector of transportation, communications, and public utilities were reportedly the largest single category of insured employment (table III.C.2.e.-1), with 162 workers or 22.0 percent of the total. The public sector employed about 14.1 percent of the workforce, while the construction industry, a major employer in the Kenai area of the borough, engaged a relatively small share (9.9%) of Homer's workforce. Because of disclosure restrictions, an exact tabulation of manufacturing employment is not available, but it is estimated at about 10 percent of total employment, most of it in the fish and shellfish processing industry. These manufacturing jobs and other secondary employment engendered by the fishing industry should be considered in weighing the full economic importance of the fisheries industry to Homer.

The trend for Homer's economy in the current decade has been expansionist. Employment has grown from 417 in 1970 to 735 as of 1977, an increase of 76 percent. The most dynamic elements of the economy have been those sectors oriented to the visitor industries. Thus, between 1970 and 1977, employment in trade tripled and service employment increased by 140 percent, in each case a rate of growth well above the overall rate for Homer's economy.

However, local impressions and interviews indicate that the summer of 1979 is expected to bring a temporary reversal in this growth trend. The vitality of Homer's visitor industry is closely tied to the growth and prosperity of the Anchorage area it largely serves and the current post-pipeline economic deceleration in the Anchorage area will likely be reflected in this sector of Homer's economy.

On the other hand, the fishing and fish processing industry appears to have consolidated and stabilized its role in Homer's economy. This has come about through improvements in the management regime for fisheries, added investment in the fish processing industry and the Homer-based fishing fleet, and better fleet services. It appears likely that continuing efforts to improve port facilities and to develop and explore the groundfish resources of the region will further enhance the economic development of Homer's fisheries industry.

Income Levels: The most pertinent data for estimating incomes at Homer is the income data previously cited for the Kenai-Cook Inlet region as a whole. According to the Alaska Department of Labor, the average wage in the Kenai-Cook Inlet region in 1977 was $23,386, nearly 10 percent above the statewide average. Other things being equal, Homer wage earners would, by inference, also have above average earnings. While there is no specific income data to support a different conclusion, there are circumstantial factors which suggest that Homer incomes may be somewhat below regional averages. This hypothesis is based on the composition of employment at Homer. There are relatively few jobs in construction and mining, the two best paying sectors (table III.C.2.e.-2).

Table III.C.2.e.-1
Nonagricultural Wage and Salary Employment Distribution Homer Labor Area [1]
1970-1977

	1970		1970-1977
	Number	%	% Change
Agriculture, Forestry, and Fisheries	2/		
Mining	2/		
Contract Construction	2/		
Manufacturing	2/		
Transportation, Communications and Public Utilities	98	22.8	74.2
Trade	40	9.6	300.0
Finance, Insurance, and Real Estate	17	4.1	105.8
Service	44	10.6	140.9
Miscellaneous	0		
Government	45	10.8	131.1
Federal	(2/)		
State & Local	(2/)		
TOTAL	417	100.0	76.3

1/ Includes Anchor Point, Diamond Ridge, Fritz Creek, and Kachemak.
2/ Employment figures withheld to comply with disclosure regulations.

Source: Alaska Consultants, Inc., 1980. Table 81, p. 246.

Table III.C.2.e.-2
Average Annual Full-Time Employment 1/
Homer Labor Area 2/
1979

Industry Classification	Number	Percent	% Basic	Basic Number	Secondary Number
Agriculture, Forestry, and Fishing	400 3/	24.7	98	392	8
Mining	0 4/	0.0	--	0	0
Contract Construction	49	3.0	12	6	43
Manufacturing	151	9.3	95	143	8
Transportation, Communication, & Public Utilities	139	8.6	46	64	75
Trade	311	19.2	37	115	196
Finance, Insurance, and Real Estate	77	4.7	31	24	53
Service	198	12.2	24	53	145
Government	296	18.3	42	125	171
Federal	(78)	(4.8)	(80)	(62)	(16)
State	(71)	(4.4)	(48)	(34)	(37)
Local	(147)	(9.1)	(20)	(29)	(118)
TOTAL	1,621	100.0	57	922	699

1/ Includes self-employed and military personnel.

2/ The Homer labor area is defined as the Homer Precinct, Anchor Point, Fritz Creek, Diamond Ridge, and Kachemak.

3/ Number of fishermen employed on an average annual year-round basis estimated by using yearly registration data, length of fishing season, and normal "crew" sizes for various types of fishing vessels.

4/ Minor employment in sand and gravel considered with contract construction and transportation.

Source: Alaska Consultants, Inc., 1980. Table 7, p. 31.

On the other hand, a disproportionate share of Homer's employment is concentrated in trade and services and fish processing, each of which tends to pay low average wages on a seasonal basis.

Data on income assistance program disbursements reveal that the financial assistance distributed through such programs in Homer is not large.

Local Government Finances: In order to evaluate the fiscal condition of the city of Homer, the most recent city financial statement for the fiscal year ending June 30, 1978, was reviewed, along with data on assessed valuations, municipal debt and real property and sales tax rates published by the State Assessor's Office.

As of 1978, Homer's assessed valuation per capital stood at $32,553 (table III.C.2.e.-3). This was well below the statewide per capita valuation of $50,398 for that year. However, the statewide average is seriously distorted by the inclusion of the trans-Alaska pipeline and related taxable real property. If the pipeline-related property tax base is omitted, then the resulting average statewide per capita figure would approximate Homer's per capita valuation.

An examination of the trend in Homer's equalized assessed valuation over the past decade shows that the assessed value of Homer's real property tax base has risen from $10,913,000 in 1960 to $66,896,000 by 1978, an increase of 513 percent. The great bulk of this increase accrued in the last 3 years, coincident with the spurt of economic and population growth which Homer experienced during this period. Those years were also a time of rapid inflation in property values (table III.C.2.e.-4).

The city of Homer's debt situation as of June 30, 1978 included $2,348,000 in outstanding general obligation bonds for water and sewer improvements and for the recently built public safety building and $1,168,000 in revenue bonds for water utility improvements and port facilities. (Table III.C.2.e.-5 does not reflect the full amount of the city's bonded debt because the 1970 sewer general obligation bonds are recorded in the Sewer Utility Fund and are being repaid from sewer special assessments.) This debt does not consider the burden on Homer's taxpayers of their share of the Kenai Peninsula Borough's general obligation indebtedness. If a portion of the borough's debt is apportioned to the city of Homer based on its prorated share of the borough's assessed valuation, then another $2,086,866 in debt can be tallied against the city of Homer's property tax base.

Compared to other small cities across the nation, Homer's ratio of direct general obligation bonded debt to its assessed valuation is 3.52 percent which compares favorably with the median value of 5.5 percent reported by Moody's Investors Service, Inc. for selected cities under 10,000 population. However, if Homer's share of the borough's debt is included, the city has a less favorable 6.64 percent ratio of bonded debt to local assessed valuation. Nevertheless, the city's overall financial position has improved measureably in the last couple of years due to increases in assessed valuations and to retirement of a portion of the city's outstanding bonds.

The greater part of the city of Homer's direct debt was incurred for bonds for water utility improvements and the public safety building. These bonds are being retired by means of a city sales tax levied and pledged for those projects.

Table III.C.2.e.-3
Indicators of Financial Condition
City of Homer, Alaska
FY 1978

Population	2,055[1]
Full Value Determination	$66,896,480.00
Full Value Per Capita	$ 32,553.00
General Obligation Debt	$ 2,357,812.00
Total Debt[2]	$ 4,444,678.00
Per Capita Debt	
General Obligation	$ 1,147.00
Total	$ 2,163.00
Debt as Percent of Full Value	
General Obligation	3.52%
Total	6.64%
Guidelines for Per Capita Debt	
Direct	$ 618.48
Overall	$ 733.93
Percent of Full Value[3]	5.50%

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[1] Homer's July 1977 population as accepted by the Department of Community and Regional Affairs for State Revenue Sharing Purposes.

[2] Total debt equals Homer's G.O. bonded debt plus a pro-rated share ($2,086,866) of the Kenai Peninsula Borough's G.O. bonded debt based on the city of Homer's accounting for 4.3 percent of the borough's 1978 full value determination.

[3] Median value for selected places of under 10,000 population used by Moody's Investors Services, Inc.

Sources: Alaska Consultants, Inc., 1980. Table 98, p. 311.

Table III.C.2.e.-4
City of Homer
Comparison of Full Value Determination
1969 - 1978
(in $000's to nearest $1,000)

Year	Full Value Determination
1969	$10,913
1970	$11,450
1971	$12,969
1972	$12,552
1973	$17,616
1974	$22,789
1975	$25,406
1976	$32,129
1977	$42,918
1978	$66,896

Source: Alaska Consultants, Inc., 1980. Table 99, p. 312.

Table III.C.2.e.-5
City of Homer
General Bonded Debt
Schedule of Debt Service Requirements to Maturity
JUNE 30, 1978

Fiscal Year	Principal	Interest	Total Annual Requirement
1979	$ 54,000	$ 90,124	$ 144,124
1980	60,000	86,488	146,488
1985	84,000	68,156	152,156
1990	43,000	52,701	95,701
1995	52,000	52,570	94,570
2000	30,000	33,750	63,750

Source: Alaska Consultants, Inc., 1980. Table 100, p. 313.

City general fund expenditures in 1978 totalled $1,048,415. The most heavily supported local government functions were police protection ($263,997), general government administration $168,630) and public works administration ($167,687) (table III.C.2.e.-6). These three functions absorbed well over half of the city's general fund budget. Not included in this account of general fund expenditures were a variety of other enterprise fund and debt service funds whose outlays were financed by special assessments, user charges, and other non-general fund sources.

The primary source of general fund revenues was property tax levies which yielded $500,758 or 55.1 percent of all general fund revenues. Intergovernmental revenues from the State and federal governments contributed another 36.2 percent, while miscellaneous fees, etc., provided the remainder.

The property tax rate for Homer in 1978 was 12 mils, a rate the city has maintained since 1972 except for 1975 when it rose to 14 mils (see table III.C.2.e.-7). This property tax rate is slightly lower than the average for the four other major settlements in the borough where 1978 rates ranged from a low of 11.0 mils at Soldotna to a high of 16.5 mils at Seldovia. Above the local city property tax, Homer real property owners are also assessed an additional 6.5 mils by the Kenai Peninsula Borough for purposes of school support (4.035 mils), hospitals (2.0 mils), and borough administration (0.465 mils).

Homer residents also pay a 5-percent sales tax composed of a 3-percent city sales tax earmarked for debt service and a 2-percent borough sales tax allotted to finance the school system.

Overall, the city of Homer appears to be in generally sound fiscal health, especially with the improvement shown in its debt situation in the last few years. Assessed valuations are about average for Alaska municipalities and property tax and sales tax rates are comparable to other cities in the region, although they are above State averages.

Table III.C.2.e.-6
General Fund
Statement of Revenues and Expenditures
City of Homer
Year Ended June 30, 1978

Revenues	Revenues Actual
General Property Taxes	$ 507,516
Less: Uncollectable Taxes	(11,389)
Total Taxes	496,127
Penalties and Interest on Taxes	4,631
	500,758
State of Alaska:	
Shared Revenue:	
Public Utilities	14,459
Business License	62,044
Alcohol Beverage Licenses	12,600
Gaming Devices	706
Fish Tax	6,475
Shared Revenue	74,775
Other Appropriations:	
Roads and Trails	10,889
Street Signs	4,445
Other	4,117
	190,510
Grants and Interfund Transfers:	
CETA Program Grant	113,013
Interfund Transfers:	
Anti-recession Funds	7,992
Federal Shared Revenue	--
Public Works Services	17,546
	138,551
Other Revenue:	
Public Safety Building Use/Services:	
Rent Revenue	2,210
Dispatcher Services	19,250
Other Services	4,200
Municipal Fees:	
Permits and Licenses	1,808
Fines and Forfeitures	9,730
Animal Licenses	2,475

Source: Alaska Consultants, Inc., 1980. Table 101, p. 316.

Table III.C.2.e.-7
City of Homer
Property and Sales Tax Rates
1972 - 1978

	Property Tax (mills)	
	1972	1978
City of Homer	12.00	12.000
Borough - Administration		0.465
Borough - Schools	5.00	4.035
Borough - Hospitals (South)	____	2.000
TOTAL	17.00	18.500

	Sales Tax (percent)	
	1972	1978
City of Homer		3.00
Borough - Schools	3.00	2.00
TOTAL	3.00	5.00

Source: Alaska Consultants, Inc., 1980. Table 102, p. 318.

APPENDIX R

DESCRIPTION OF THE ENVIRONMENT LAND STATUS AND LAND USE

5. Land Status and Land Use:

a. Land Status: Land ownership patterns in the uplands and coastal areas near the proposed sale area are complex and changing. More than 90 percent of the land is in public ownership. The public ownership pattern is being determined by two major issues: Federal emergency actions under the Antiquities Act (16 USC 431; 43 FR 57009) and the Federal Land Management and Policy Act (FLMPA) of 1976 (43 USC 1714(e); PLO 5643, 5644; 43 FR 59756), and proposed Federal legislation variously referred to as "D-2," "National Interest Lands," or "Alaska Lands" legislation. Additionally, the prerogatives of the State of Alaska under the Alaska Statehood Act (PL 85-508), the indigenous peoples of Alaska under the Alaska Native Claims Settlement Act (ANCSA; 43 USC 1601); and local governments of Alaska under State Enabling Acts (AS 29.18; AS 38.04; Ch. 180-182, SLA 1978; Ch. 85 SLA 1979), complicate any mapped configuration of land ownership.

The following description of current land status references other detailed sources of land status information which are not presented in depth here (Environmental Consultants, 1979; DOI, BLM, 1979; DOI, 1979; Alaska DNR, 1979; U.S. House Committee on Interior and Insular Affairs, 1976). The land status description does not include the Shelikof Strait portion of the proposed sale area; this was presented in the DEIS on the now cancelled OCS sale 46-Western Gulf of Alaska (DOI, BLM, 1979). Graphic 16 depicts current land status with the degree of resolution possible at a scale of 1:3,000,000.

Federal Lands: Existing major Federal land holdings include the Kenai National Moose Range and the Chugach National Forest on the Kenai Peninsula. The Kenai National Moose Range (1,330,000 acres), and the Chugach National Forest (1,006,000 acres within the borough) occupy most of the Kenai Peninsula northwest and west of the Kenai Mountains.

On the west side of Cook Inlet, lies the Tuxedni National Wildlife Refuge (NWR) which is located on Chisik Island. This refuge functions to protect colonial nesting birds. On the Aleutian Range south of Kamishak Bay, lies the Katmai National Monument, which is administered by the U.S. National Park Service (NPS). The existing portions of the monument include the coastline of the Shelikof Strait extending from Cape Douglas to Kashvik Bay.

Under authority of the Antiquities Act and FLMPA, the U.S. Administration created new land management designations for several major locations, either west of Cook Inlet, west of Shelikof Strait, or situated on the Kenai Peninsula. These lands were already in the public domain. Following is a listing of the new management units:

Monument Actions (16 USC 1431; 43 FR 57009)

Additions to the Katmai Monument: The monument is located on the interior of the Alaska Peninsula between Lake Iliamna and Lake Becharof. The monument is intended for national park and national wilderness designation, pending D-2 legislation.

Creation of a Becharof National Monument: This monument includes portions of the coastline of the Alaska Peninsula from Kashvik Bay in Shelikof Strait to Cape Igyak south of the strait. The monument is intended for a National Wildlife Refuge (NWR) designation, pending D-2 legislation.

Creation of a Lake Clark National Monument: The monument includes roughly 100 miles of the Chignik Mountains, west of Cook Inlet. Coastal portions of the monument extend from north of the Tuxedni Bay to south of Chinitna Bay. The monument is intended for national park designation, pending D-2 legislation.

Creation of a Kenai Fjords National Monument Along the Gulf of Alaska Side of the Kenai Peninsula: The monument comprises portions of the Kenai Mountains and extends to the coastline from Nuka Pass at its south, up to Resurrection Bay at the north. The monument is intended for national park designation, pending D-2 legislation.

FLPMA Withdrawals (43 USC 1714 (e); PLO 5653, 5654; 43 FR 58756)

Withdrawal of Lands in the Kenai Mountains and the Head of Kachemak Bay: This withdrawal is intended for NWR designation, pending D-2 legislation. Subsequent to the FLMPA section 204(e) withdrawal, the DOI created an NWR for this area under authority of FLMPA section 204(c) (43 USC 1714(c); PLO 5698; 45 FR 9578). This FLMPA withdrawal has a 30-year duration, but is likely to be changed under pending D-2 legislation. The Wildlife Refuge status in the area conflicts with some Native corporation and State land selections.

Withdrawal of Lands Surrounding Lake Iliamna in the Interior of the Aleutian Range: The withdrawal also includes the coastline of lower Cook Inlet from Iliamna Bay to Chinuna Bay. This area is also referred to as the Iniskin Peninsula. The withdrawal is intended for NWR designation, pending D-2 legislation (FWS, 1980). However, the Iniskin Peninsula portion of the withdrawal may be excluded from future NWR designation under pending D-2 legislation; the peninsula area has been the subject of Native corporation land selections under the terms of the Cook Inlet Exchange, and the peninsular ecosystem is different from that predominating in the FLMPA withdrawal.

Withdrawal of Unappropriated Islands, Rocks, Headlands, Spires, and Shoals Which are Significant for Marine Mammals and Migratory Water Fowl: The FLMPA withdrawal includes locations in Cook Inlet, Kamishak Bay, Shelikof Strait, and the Gulf of Alaska side of the Kenai Peninsula. The DOI more recently created a 30-year NWR for the withdrawn marine resources area under authority of FLMPA section 204(c)(43 USC 1714 (c); PLO 5710; 45 FR 9704). The withdrawal intended for an NWR designation under D-2 legislation.

State Lands

The State of Alaska has several major land holdings near the proposed sale area. It is additionally requesting lands due to it under provisions of the Statehood Act and the Cook Inlet Land Exchange. Refer to graphic 16 for identification of the State selected lands.

The Beluga River Drainage-Tyonek Area with 830,000 Acres: This area is rich in coal deposits, potential oil and gas reserves, and has timber-range land potential.

Kamishak Bay Area with 256,000 Acres: The State should receive additional acreage from the U.S. under terms of the Cook Inlet Land Exchange in this area. The Kamishak Bay area State land holdings include the McNeil River State Game Sanctuary.

Kenai Peninsula Lowlands with 541,000 Acres: This area includes most of the Kenai Peninsula to the west of the Kenai Moose Range boundary. The State ownership near the Sterling Highway corridor is limited, however.

Kenai Peninsula East of the Kachemak Bay with Some 320,000 Acres: The State land holdings are in State game, park, and critical habitat management units.

Kenai Peninsula-Diverse State Parks, Campgrounds, and Waysides with Some 33,000 Acres: These land management units are in several locations on the peninsula. Refer to section III.C.4. of this EIS regarding recreation, and graphic 15 which depicts recreational facilities and use areas on the Kenai Peninsula.

Much of the State lands within the Kenai Peninsula Borough boundaries, with the exception of the Tyonek-Beluga mineral lands, have been obtained to protect important fisheries, waterfowl, and big game habitat. Table III.C.5.a-1 lists the major State sanctuaries, refuges, and critical habitats in the Kenai Peninsula area. All of these areas include coastal lands and some of the habitat areas include tidelands or submerged lands. These areas are administered by the Department of Natural Resources (DNR), but management guidelines and development approval are provided by the Department of Fish and Game.

The State-owned lands in the Kenai Peninsula lowlands area have been the subject of study and planning by the Alaska DNR (Alaska DNR, 1979). In 1979, the State identified which of the vacant, unappropriated, and unreserved State lands should be retained in State ownership as "public interest" lands. The State identified these lands in response to competing claims on the Kenai Peninsula by the Cook Inlet Regional Corporation (CIRI), the Kenai Peninsula Borough, and individual cities.

The State selected approximately 100,000 acres of land from its unappropriated holdings of 416,000 acres. The public interest selections considered various resource management values; agriculture, recreation, scenic values, fish and wildlife habitat, extractive materials, forestry, and watershed. Figure III.C.5.a.-1 shows the location of the public interest lands to be retained in State ownership. The Alaska DNR is presently classifying these lands for appropriate uses and management.

Borough, City, and Private Lands: Nearly all of the current borough, city, and private lands (except Native corporation lands) in lower Cook Inlet near the proposed sale area are located on the Kenai Peninsula lowlands. The majority of these lands are located along the Sterling State Highway corridor from Homer to Soldotna, on the Kenai Spur Road from Kenai northward, and along the northern shores of Kachemak Bay. Most borough, city, and private lands are in close proximity (less than 10 mi) to the coastal waters of either Cook Inlet, Kachemak Bay, or Resurrection Bay. The borough, city, and private land holdings are in parcel sizes of one section (1 sq mi) or less in the Public Land Survey system. As such, detailed mapping of the configuration of borough, city, and privately held lands on graphic 16 is not possible.

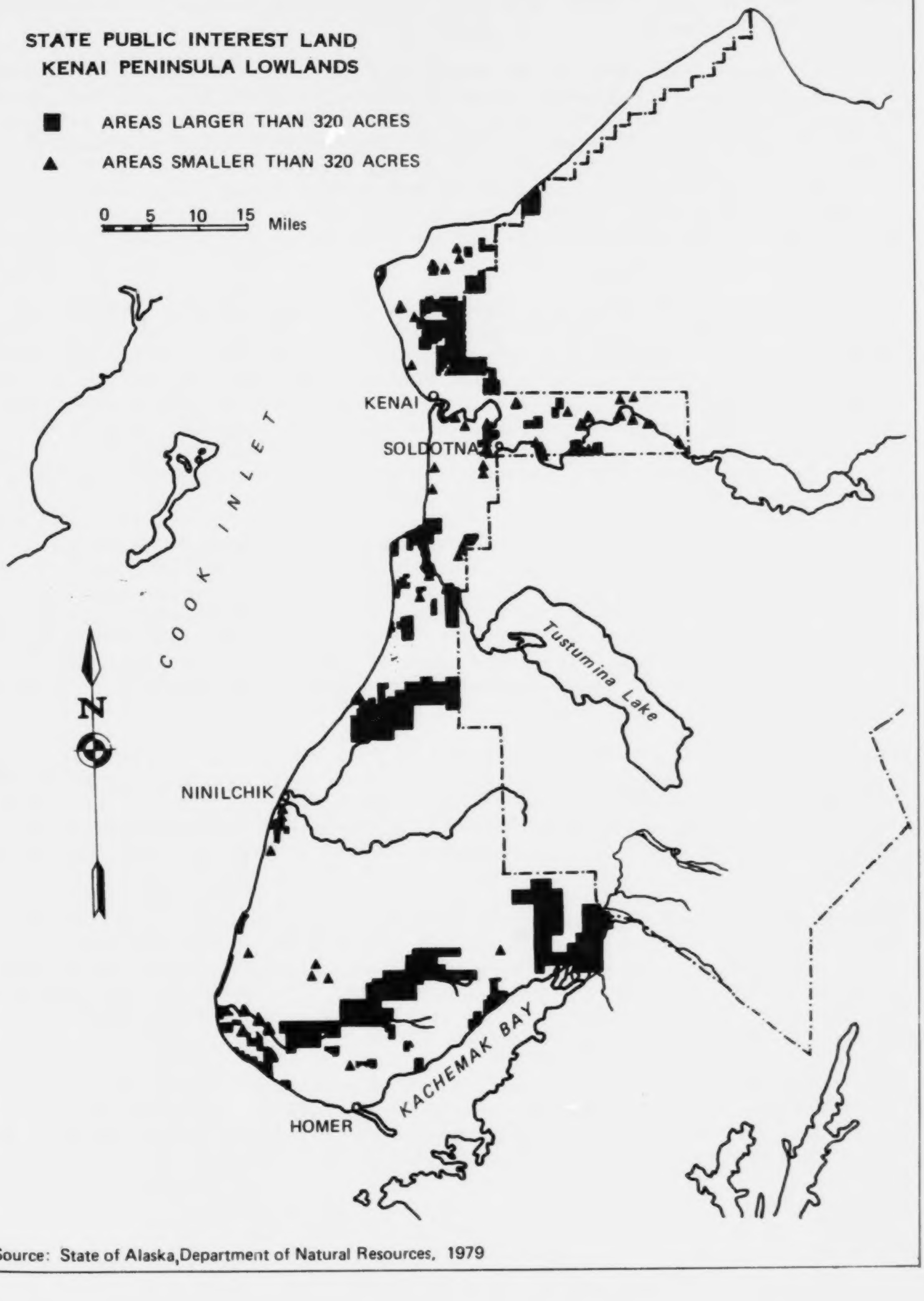
Native Corporation Lands: Under provisions of the Alaska Native Claims Settlement Act (ANCSA, 43 USC 1601, as amended), the indigenous Natives of Alaska are entitled to real property allotments among other provisions as a settlement for all aboriginal claims against the United States. The Act required Natives

Table III.C.5.a.-1
State Sanctuaries, Refuges, and Critical Habitats in the Lower Cook Inlet Area

Location and Name	Approximate Acreage	Established to Protect and Perpetuate:
Existing		
McNeil River State Game Sanctuary	95,760	Brown bear and other big game
Trading Bay State Game Refuge	168,993	Waterfowl and big game habitat and hunting
Clam Gulch Critical Habitat	30,080	Razor clam habitat area
Fox River Flats Critical Habitat Area	6,720	Waterfowl habitat
Kachemak Bay Critical Habitat Area	215,000	Productive habitat for fisheries stocks, and spawning, rearing, and breeding for shellfish, crab, shrimp, and fish
Kalgin Island Critical Habitat Area	2,880	Unique tidal marsh used by migrating waterfowl
Proposed		
Redoubt Bay State Refuge	205,208	Waterfowl and big game habitat
Kamishak-Chinitna Bay Critical Habitat Area		Spawning, feeding, rearing, and breeding habitats for salmon and shellfish

FIGURE III. C. 5. a – 1

STATE PUBLIC INTEREST LAND
KENAI PENINSULA LOWLANDS


■ AREAS LARGER THAN 320 ACRES
▲ AREAS SMALLER THAN 320 ACRES
0 5 10 15 Miles
N
KENAI
SOLDOTNA
COOK INLET
Tustumina Lake
NINILCHIK
KACHEMAK BAY
HOMER

Source: State of Alaska, Department of Natural Resources, 1979 to create village and regional for-profit corporations in order to receive their land entitlements. In the proposed lease sale region, there are three regional Native corporations: the Cook Inlet Region, Inc. (CIRI), Koniag, and Chugach Natives, Inc. Refer to graphic 16 for delineation of ANCSA regional corporation boundaries.

ANCSA village corporations in the vicinity of the proposed lease sale include Ninilchik, Seldovia, Salamatof, Point Possession, English Bay, and Port Graham. Salamatof and Point Possession have yet to be certified as eligible villages under the enrollment procedures of ANCSA. The Native village of Tyonek is located on the west side of Cook Inlet in the Beluga area. Several Native village corporations are located on the Kodiak Archipelago, with some present in the Shelikof Strait. Refer to the DEIS on the now cancelled sale 46 for discussion of land status affected by the Shelikof Strait portion of proposed sale 60.

Graphic 16 depicts Native corporation lands as either selected, interim conveyed, or conflicting selections with the State of Alaska and/or its political subdivisions. Table III.C.5.a.-2 summarizes the land status in acreage amounts for the above-mentioned villages. The current land status of village corporations belonging to CIRI, as well as CIRI itself, is rather complicated. The villages and regional corporations were unable to procedurally satisfy their land entitlement options under terms of ANCSA because much of the land in the region was unavailable, already conveyed, or tentatively approved for conveyance to the State and its political subdivisions.

The Cook Inlet Land Exchange was authorized as an amendment to ANCSA which would make available satisfactory land allotments to village corporations and CIRI within the boundaries of CIRI itself (PL 94-456; U.S. House Committee on Interior and Insular Affairs, 1976). Under terms of the exchange, the State has conveyed approximately 450,000 acres of land within the CIRI boundaries to the regional corporation. The lands conveyed come under selection "pools" located on the Kenai Peninsula lowlands (Kenai Pool), the Beluga area townships (Beluga Pool), and the Knik-Willow area (Knik Pool).

Under the exchange, 138,000 additional acres are authorized for CIRI selection from State lands. Some of these selections will occur in the CIRI boundaries, and other selections will be located in other parts of the State. In return for the State lands made available to the CIRI through the exchange, the State will receive from the U.S. equal acreages of land located in other regions of the State.

Village corporations affected by the Cook Inlet Land Exchange, and located in the coastal zone Cook Inlet area, will be entitled to roughly 262,000 acres of land. The village corporation involved includes Alexander Creek, Chickaloon, Knik, Ninilchik, Seldovia, Tyonek, and Salamatof. In the event that Salamatof and Alexander Creek are determined to be eligible under ANCSA provisions, they will participate in this entitlement.

Apart from the Cook Inlet land exchange, a major area of Native land selections outstanding is the Tuxedni-Iniskin area. CIRI has selected approximately 262,000 acres of land which would be reconveyed to village corporations to satisfy their entitlements under ANCSA.

Table III.C.5.a.-2
Native Village Corporation Land Status in
Vicinity of Cook Inlet Area
(Acres)

Village	Land Entitlement[3]	Land Selection Outstanding[4]	Interim Conveyance	Patented Lands
Cook Inlet Region, Inc. (CIRI)				
Ninilchik	115,200	78,681	66,737	3,837
Seldovia	115,200	84,297	55,220	745
Tyonek	115,200	76,213	64,541	10
Salamatof[2]	92,160	NA	0	0
Pt. Possession[2]	69,120	NA	0	0
Chugach Natives, Inc.				
English Bay	74,369	85,267	44,702	0
Port Graham	106,205	177,350	65,832	12

NA = Not available

[1] Villages included in this table do not represent all Native village corporations within the boundaries of Cook Inlet Region, Inc., and Chugach Natives, Inc. Instead, the villages included represented those which are situated on or near the coastline of Cook Inlet and which are in the vicinity of the proposed lease sale area discussed in the DEIS on the now cancelled OCS sale 46 (DOI, BLM, 1979).

[2] The eligibility of the villages of Salamatof and Pt. Possession has yet to be determined under ANCSA provisions. The village of Pt. Possession has been determined to be ineligible but it is challenging this determination.

[3] Land entitlement represents the amount of acreage entitled to the villages under ANCSA provisions.

[4] Land selection outstanding represents the amount of acreage which the villages have selected, but which has yet to be disposed. Villages typically "overselect" the amount of acreage entitled to them. Hence, the sum of "Selections Outstanding," "Interim Conveyance," and "Patented Lands," will not equal "Land Entitlements."

b. Existing Land Use: Developed land use in the Cook Inlet portion of the proposed sale area is located primarily on the lowlands of the Kenai Peninsula. Graphic 16 shows incorporated and unincorporated Kenai Peninsula communities and established settlements. Urban land use, i.e., residential, commercial, and industrial uses, are restricted to the communities identified as shown on graphic 16. Some limited agricultural land use occurs on large parcels on the Kenai lowlands near the Sterling Highway corridor.

Oil and gas development occurs on the Kenai Peninsula and in the territorial waters of upper Cook Inlet. The Swanson River oilfield is located within the Kenai National Moose Range boundaries northeast of Kenai. Offshore producing oilfields also exist in the territorial waters of Cook Inlet at the Middle Ground Shoal area and offshore between west Foreland and Granite Point. Producing gas fields are present in upper Cook Inlet and in specific points along the Kenai Peninsula: Kenai, Beaver Creek Inlet, False Creek, and Anchor Point. Industrial facilities serving the known Cook Inlet hydrocarbon fields are located in the coastal area of Nikiski and north Kenai. Refer to figure III.C.5.b.-1 for a depiction of these facilities and the adjacent land uses.

On the west side of Cook Inlet, developed land uses are restricted to oil and gas onshore facilities at Drift River and Trading Bay and a Native village located at Tyonek. Other Native villages exist at the head of the inlet in the Knik Arm area; however, this area is beyond an area of consideration for the proposed lease sale. The Tyonek-Beluga townships area is proposed for extensive coal development although no extraction is occurring there presently (Placer Amex, Inc., 1977; DOE, 1979). Refer to section IV.A.2.h. of this EIS regarding other major development actions.

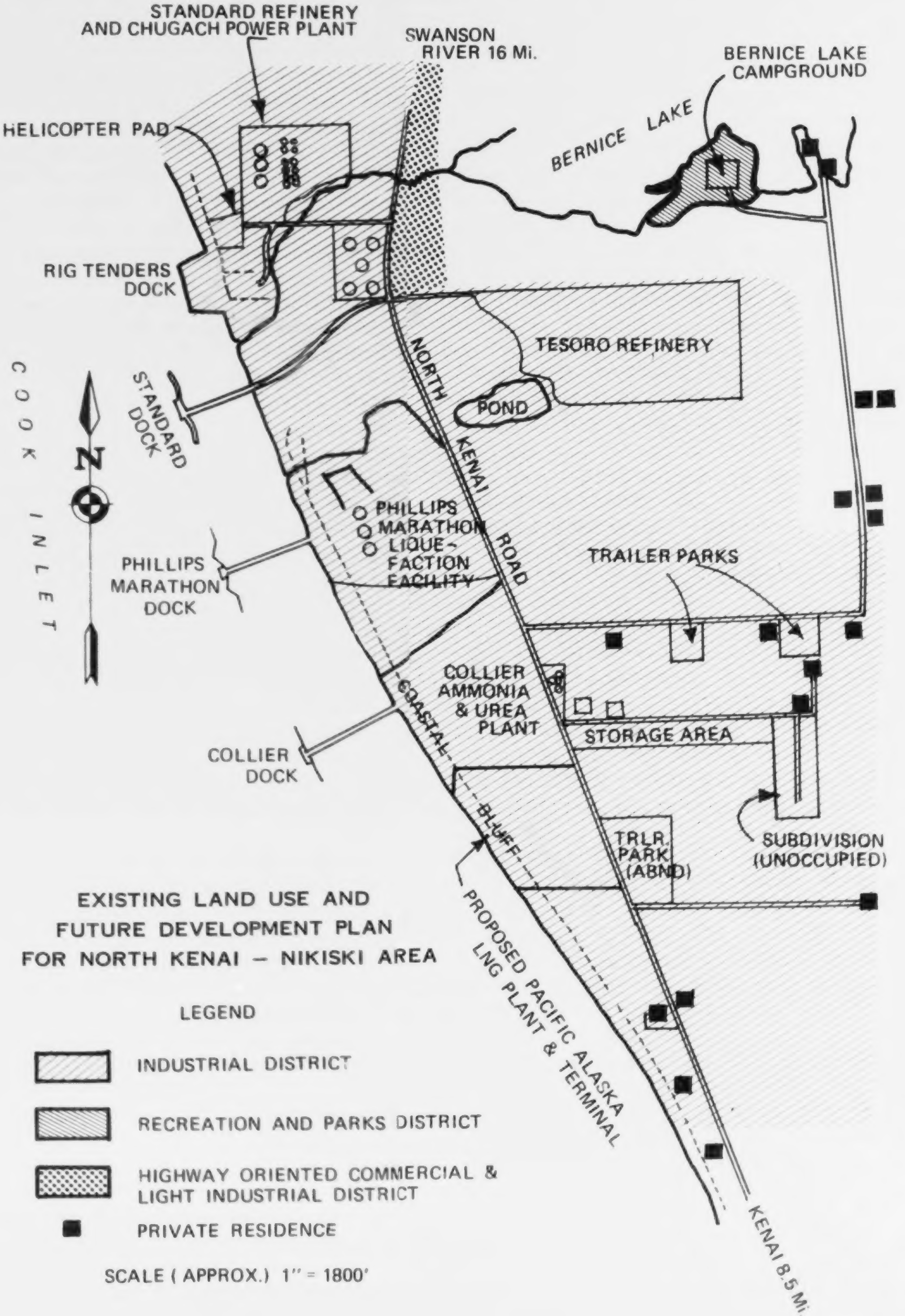
The developed land uses in the Shelikof Strait portion of the proposed sale area are restricted to Native village settlements and fishing camps. Graphic 16 depicts the location of these villages. Refer to sections III.C.1.b. and III.C.1.d. regarding local infrastructure and subsistence for further discussion of these villages and settlements.

Aside from settlements in the coastal zone of the proposed sale area, land uses are restricted to resource conservation and recreational utilization generally. Much of the coastal and uplands terrain surrounding Cook Inlet is in Federally managed National Wildlife Refuges, National Monuments, and National Resource areas. Refer to III.C.5.a. regarding land status. Graphic 16 depicts these management units for their coastal boundaries. Refer also to graphic 15 and section III.C.4. on recreation, visual, and wilderness resources regarding these management units.

The management status and land use activities allowed on these Federal units is summarized below with the exception of that portion of the Katmai National Monument which existed before the 1978 enlargement, and the Kenai National Moose Range. These management units have authorized master plans which are discussed below in III.C.5.c.

Enlargement of the Katmai National Monument: The addition to the national monument created by executive proclamation of 1978 has been the subject of emergency regulations of the National Park Service (NPS) (36 CFR 1.2(g), 7.87; 43 FR 60254). The NPS has proposed general management regulations for the monument additions (36 CFR Part 13 (new); 44 FR 37732). However, permanent

FIGURE III. C.5. b – 1



EXISTING LAND USE AND FUTURE DEVELOPMENT PLAN FOR NORTH KENAI – NIKISKI AREA

STANDARD REFINERY AND CHUGACH POWER PLANT
SWANSON RIVER 16 Mi.
BERNICE LAKE CAMPGROUND
BERNICE LAKE
HELICOPTER PAD
RIG TENDERS DOCK
TESORO REFINERY
NORTH KENAI ROAD
POND
STANDARD DOCK
COOK INLET
N
PHILLIPS MARATHON LIQUE-FACTION FACILITY
PHILLIPS MARATHON DOCK
TRAILER PARKS
COLLIER AMMONIA & UREA PLANT
STORAGE AREA
COASTAL BLUFF
COLLIER DOCK
TRLR. PARK (ABND)
SUBDIVISION (UNOCCUPIED)
PROPOSED PACIFIC ALASKA LNG PLANT & TERMINAL
KENAI 8.5 Mi.
LEGEND
▨ INDUSTRIAL DISTRICT
▨ RECREATION AND PARKS DISTRICT
▒ HIGHWAY ORIENTED COMMERCIAL & LIGHT INDUSTRIAL DISTRICT
■ PRIVATE RESIDENCE
SCALE (APPROX.) 1″ = 1800′

Source: Alaska State Housing Authority, 1970; Dames & Moore, 1979 regulations have yet to be adopted. The monument enlargement, as well as the existing monument, are proposed as a national park under pending D-2 legislation.

Lake Clark National Monument, Kenai Fjords National Monument: These monuments were created by executive proclamation of 1978 (43 FR 57079; 43 FR 57067). They are presently being managed by the NPS pending D-2 legislation. The monuments are managed under the same regulations mentioned above pertaining to the enlargement of the Katmai National Monument. The interim emergency regulations issued for the NPS-managed monuments are different from the NPS management objectives and requirements for parklands throughout the United States. These regulations will allow land uses of non-motorized recreation, subsistence hunting, fishing and trapping, sportfishing, firearms possession and use, and limited forms of motorized access. Sport hunting, siting of permanent structures, and new mining claims are prohibited land uses of monument lands. Existing mining claims in the newly created monuments are subject of the Mining in the Parks Law (PL 94-429).

Becharof National Wildlife Monument: This new monument was created by presidential proclamation and is presently being managed by the FWS (43 FR 57025). Interim emergency regulations were issued by the FWS (44 FR 60257), and general management regulations have been proposed (50 CFR Subchapter H: Parts 96-107 (new); 44 FR 37755). Land uses allowed in the Becharof National Wildlife Monument are similar to those allowed in the Kenai National Moose Range. Refer to section III.C.5.c.

FLMPA Withdrawals: Kenai Fjords and Alaska Marine Resources Refuges: These areas are managed by the FWS under existing general management regulations of the National Wildlife Refuge System (50 CFR Subchapter C: Part 25).

The FWS intends to issue interim regulations on these lands which would generally keep them open to public access. Land uses allowed would be similar to those allowed on the Kenai National Moose Range. Refer to section III.5.c. regarding the Kenai National Moose Range.

c. Approved Land Use Master Plans: Because land use is considered to be a significant issue in this DEIS, and recognizing the CEQ guidance on consideration of approved plans of general purpose governments (40 CFR 1502.16(c), 1506.2(d)), this section briefly summarizes the provisions of applicable plans in the lease sale area. In all instances, these plans are approved by the local government or Federal agency involved. Other local communities, either on the Kodiak Archipelago, Kenai Peninsula, or the upper Cook Inlet have adopted plans. However, these areas would not be affected by the leasing proposal, and hence are excluded here.

Kenai Peninsula Borough-Unincorporated Central Peninsula: For the unincorporated areas of the borough, the borough uses as planning guidance "Comprehensive Planning Program Recommendations" (Alaska State Housing Authority, 1970), and "Comprehensive Plan Goals and Objectives" (Kenai Peninsula Borough, 1973). The area studied in the Comprehensive Planning Program extended from Kasilof-Clam Gulch on the south to Nikiski-Nikishka Bay on the north.

The 1970 plan recognized the role of hydrocarbon extraction and petroleum industry operations in preparing for future land use and development. The plan stated that future petroleum industry operations, within the analysis area mentioned above, should be concentrated in the north Kenai/Nikiski area. The plan sets aside for industrial land use at least 25 square miles of lands with 12 miles of coastal shoreline in the Nikiski area. This is the location of the existing oil and gas facilities and terminals. Refer to figure III.C.5.b.-1 for a depiction of the existing facilities in the Nikiski area.

The borough's 1970 plan also recognizes the possibility of oil and gas development in lower Cook Inlet, but the borough chose not to plan for the onshore manifestations:

> "Over the long run, anticipation of future [hydrocarbon] production assumptions adopted in this plan are that the petrochemical industry based in the Cook Inlet basin would continue to expand its level of operations although at a pace slower than that of the past decade.... The next stage of petroleum development is likely to occur offshore in the lower Cook Inlet basin, southwest of Kalgin Island.... It is unsettled to what extent development of the lower Cook Inlet basins will rely on support services and facilities already existing in the [Nikiski-Kenai-Soldotna] area, and to what new support services and facilities would be needed in the southwestern part of the peninsula area of Homer.... When it is clear that new petroleum developments are impending, the affected communities together with the borough government should be prepared to guide development and its consequences in an orderly manner and to the benefit to the communities and the borough (Alaska State Housing Authority, 1970)."

The policies of the 1970 plan for the unincorporated central peninsula region could be summarized as follows: Low density rural residential development is desirable in locations with existing road access and development. Rural residential development is planned along the Sterling Highway from Cohoe Lake and Kasilof up to Soldotna and along the Kenai Spur Road up to Daniels Lake, approximately. Rural residential development would receive only limited public services and utilities.

Urban residential development would be concentrated in the incorporated communities of Soldotna and Kenai with a small urban area at Nikishka Station Number 2.

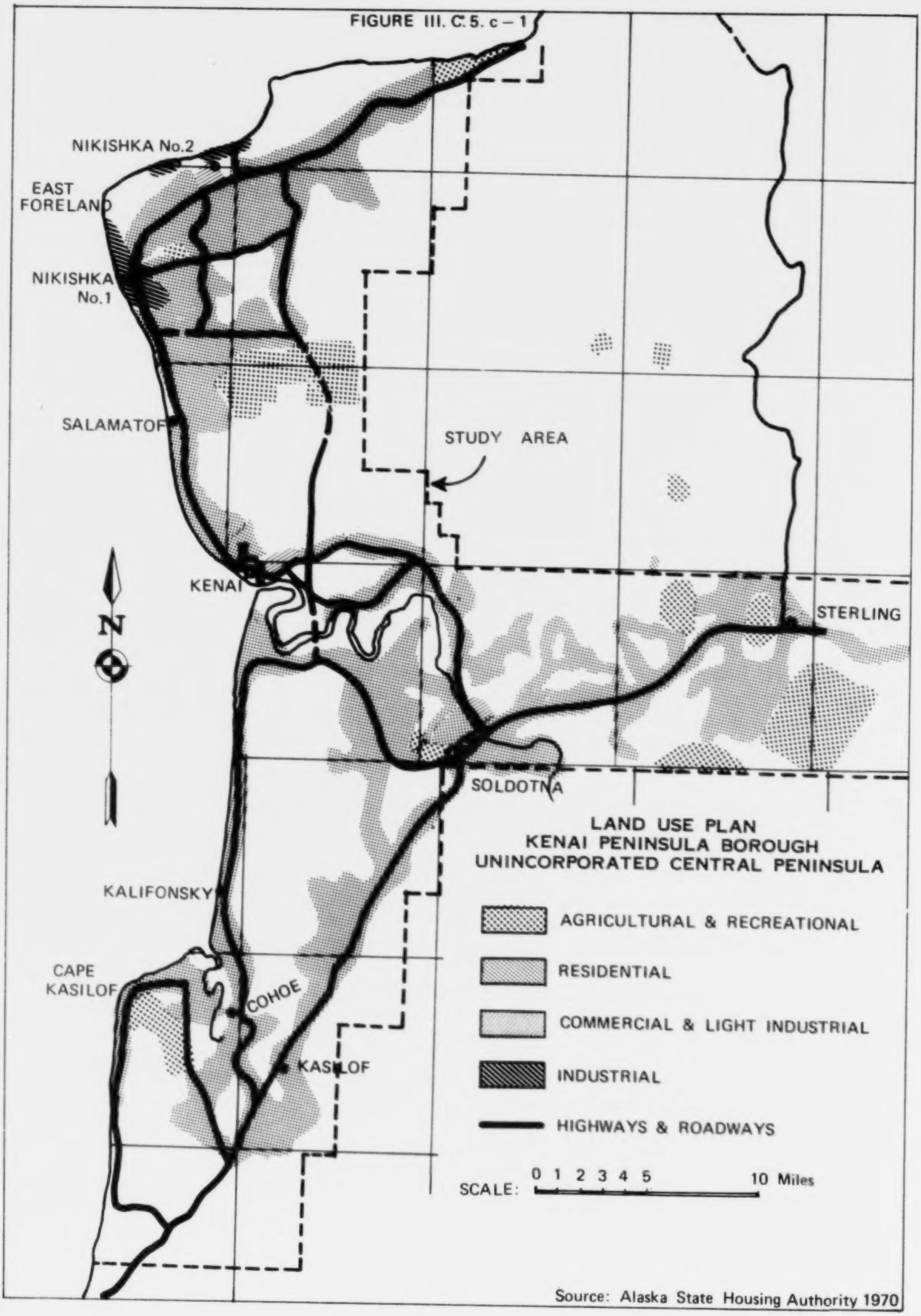
Commercial development should be concentrated in areas of convenience to users; random strip commercial development along the Sterling Highway network is discouraged. Necessary highway-oriented commercial uses would be allowed.

Industrial development should be concentrated in the existing north Kenai-Nikiski area which has clearly become the industrial center of the region (see discussion above regarding oil and gas facilities).

Agricultural land use should be encouraged on lands with prime soils and on lands with large parcel ownership.

Figure III.C.5.c.-1 shows the planned land use for the unincorporated central peninsula borough. Figure III.C.5.b.-1 overlays the borough plan land use designations in the north Kenai-Nikiski area on the existing industrial land uses of that area.

FIGURE III. C. 5. c – 1


NIKISHKA No.2
EAST FORELAND
NIKISHKA No.1
SALAMATOF
STUDY AREA
N
KENAI
STERLING
SOLDOTNA
KALIFONSKY
CAPE KASILOF
COHOE
KASILOF
AGRICULTURAL & RECREATIONAL
RESIDENTIAL
COMMERCIAL & LIGHT INDUSTRIAL
INDUSTRIAL
HIGHWAYS & ROADWAYS
SCALE: 0 1 2 3 4 5 10 Miles

LAND USE PLAN
KENAI PENINSULA BOROUGH
UNINCORPORATED CENTRAL PENINSULA

Source: Alaska State Housing Authority 1970

Kenai National Moose Range: The Moose Range has an established Range Master Plan (FWS, 1970) which is currently being updated. The principal land use of the Moose Range is to protect the moose and other wildlife habitat. Other land uses which are not detrimental to this primary land use objective of the range are allowed; recreation, boating, hiking, sport fishing, and motorized access are permitted in designated areas of the range. Oil and gas operations are also permitted on the refuge under regulated conditions. The Swanson River oilfield and the Beaver Creek unit gasfield are presently producing hydrocarbons and are located within the boundaries of the Moose Range. New trapping cabins and other permanent residential structures are not permitted land uses on the Moose Range.

The FWS is sponsoring a study of petroleum development operations on Federal natural resources lands (FWS, 1979) with particular attention to oil and gas operations on the Moose Range. The results of this study are expected to be incorporated into the new Refuge Master Plan when it is completed and adopted.

City of Kenai: The city of Kenai has recently adopted a comprehensive plan which has been approved by the Kenai Peninsula Borough Assembly (R.W. Thorpe and Associates, 1980). The comprehensive plan does not specifically consider energy development facilities or the possibility of a gas transmission line traversing the city limits. The plan, however, is predicated upon an economic and demographic projection which incorporates "moderate" discoveries of hydrocarbons from OCS leasing in Cook Inlet.

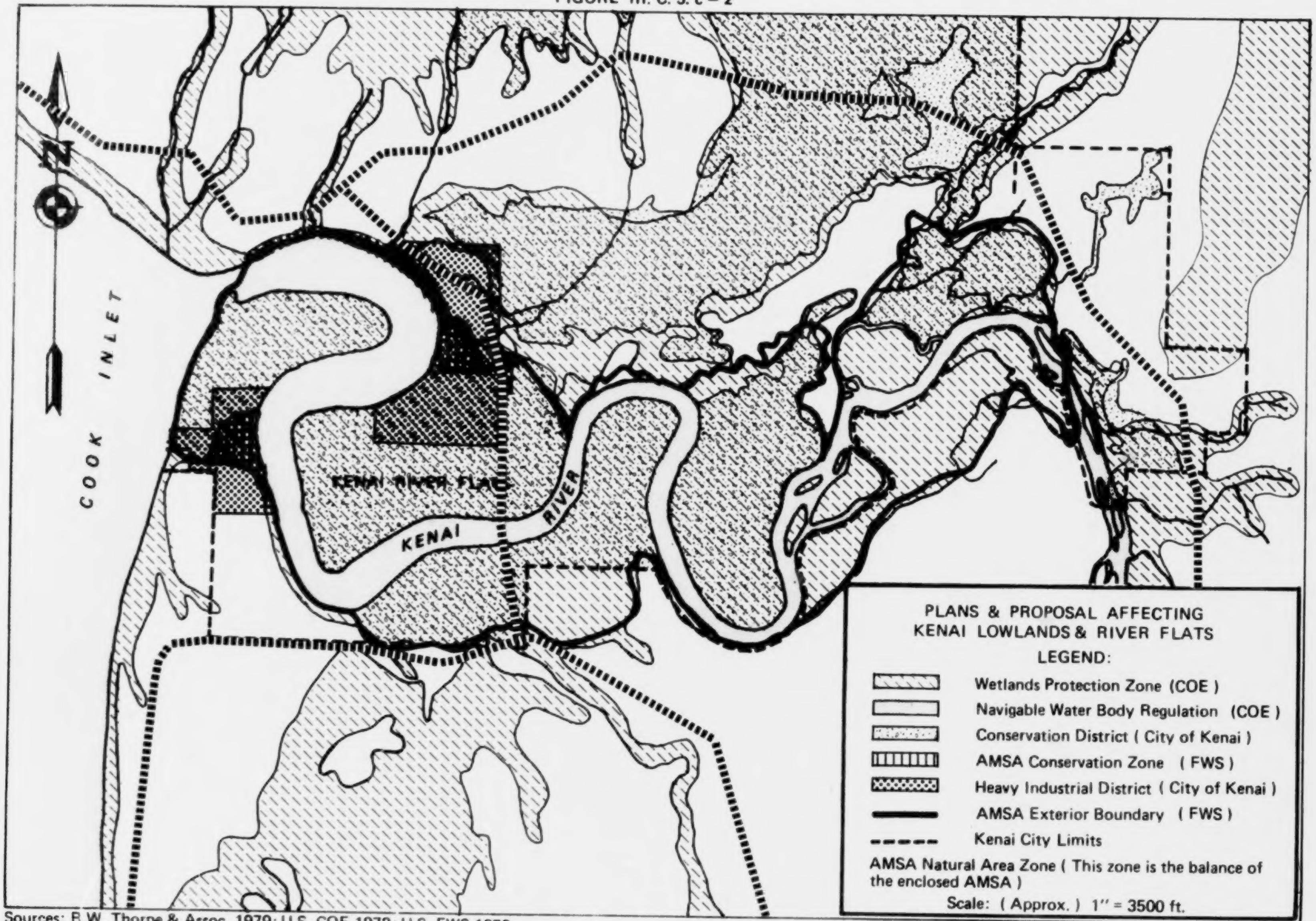
The plan provides for three residential land use districts, a public and quasi-public district, a parks, recreation, and conservation district, two commercial districts, and two industrial districts. Figure III.C.5.c.-2 schematically displays the plan. The plan diagram shows major portions of the undeveloped area being in the "Conservation," "Low Density Residential," and "Medium Density Residential," districts.

Planned industrial land use for the city of Kenai is located principally off the Beaver Loop Road on the Kenai River. This area consists of sport and fishing industry activities as well as some oil industry buildings. Future light industrial land use will be accommodated by an Office/Manufacturing Park District, which is situated east of the city airport, and at the city's boundaries of the North Kenai Road.

The Kenai Comprehensive Plan gives special attention to a Conservation District. A conservancy zone has been applied to much of the publicly owned lands (7,950 acres). A conservancy overlay with building performance standards has been applied to private lands (2,050 acres). The purposes of the conservancy designation, according to the city's plan, are: 1) to recognize building constraints caused by wetland areas and soil limitations, 2) to recognize the importance of wetland areas in terms of aquifer recharge to the water supply of the city of Kenai and local industries, 3) to recognize the importance of the Kenai River and its ecology as an economic asset to the viability of the fishing industry, and 4) to encourage development in areas where there are few building constraints in order to accommodate the projected growth of the community as expressed in its economic projections.

The plan sets forth a schedule of permitted, conditionally permitted, and not permitted uses in the conservation district. "Mining," "Transportation," and

FIGURE III. C. 5. c – 2


N
COOK INLET
KENAI RIVER FLATS
KENAI RIVER
PLANS & PROPOSAL AFFECTING
KENAI LOWLANDS & RIVER FLATS
LEGEND:
▨ Wetlands Protection Zone (COE)
☐ Navigable Water Body Regulation (COE)
▒ Conservation District (City of Kenai)
▥ AMSA Conservation Zone (FWS)
▩ Heavy Industrial District (City of Kenai)
━ AMSA Exterior Boundary (FWS)
- - - Kenai City Limits
AMSA Natural Area Zone (This zone is the balance of the enclosed AMSA)
Scale: (Approx.) 1" = 3500 ft.

Sources: R.W. Thorpe & Assoc. 1979; U.S. COE 1978; U.S. FWS 1979

"Utilities," land uses which are coastal dependent would be conditionally permitted in the Conservation District. However, the plan would not permit industrial uses which are not oriented to the water, which are not coastal dependent, and which pose adverse effects to wetlands in the Conservation District. In its evaluation of wetlands land use compatibility, the plan does not specifically consider energy or oil and gas facilities.

Corps Of Engineers-Kenai River Review: The U.S. Army Corps of Engineers (COE) Alaska District, has developed a program for management of navigable waters and wetlands along the Kenai River (U.S. Department of the Army, 1978). The management program derives from COE authority to regulate navigable waters under the Rivers and Harbors Act of 1899 and wetlands under the Federal Water Pollution Control Act as amended.

The program involves the navigable boundaries of the Kenai River system, adjacent wetland areas subject of COE authority, and contiguous flood plains which, however, are not subject of COE authority. These areas are shown for the coastal portion of the Kenai River and lowlands in figure III.C.5.c.-2.

The COE program includes a land and water use permitting system for the navigable waterways and wetlands. Allowable land and water uses within the regulated areas must be compatible with policies established for management of navigable waterways and wetlands. The policies derive from COE authorities (33 CFR 320-329), other Federal regulations, and the findings of the Kenai River Review.

In the Kenai River or its tributaries, proposals for groins, revetments, dams, gravel removal, canals, navigation channels, and the discharge of dredged or filled material would ordinarily be denied under COE authority. Proposals for the same type of activities in wetland areas adjacent to the river may be denied by the COE, if important wetland values and resources would be damaged greater than the value of the benefits realized of the proposal (33 CFR 320. 4(b)(4)).

Cities of Anchor Point and Ninilchik: The Kenai Peninsula Borough prepared a comprehensive plan for the second class cities of Anchor Point and Ninilchik (Alaska State Housing Authority, 1970). The borough land use plans for these communities include limited rural residential, tourist-related commercial, small scale agricultural, timber harvesting, fishery industries, and public-community land use districts. For the community of Anchor Point, the plan does not contemplate any industrial development. Future growth in Anchor Point is related to the economic development of Homer according to the plan. Light industrial land use demand at Anchor Point could be accommodated in the "Highway" and "Tourist Oriented Commercial" districts in the town core.

For the community of Ninilchik, the plan anticipates industrial land use needs associated with the commercial fishing industry. However, the plan questions the suitability of development on the spit or at the mouth of the Ninilchik River because of natural hazards, tsunami run-up, erosion, and flood plain problems. No other types of industrial land uses are contemplated in the land use plan for Ninilchik.

City of Homer: The city of Homer has adopted a comprehensive plan which is a revision of an earlier plan (City of Homer, 1978). The city's adopted planning policies regarding OCS development include the following:

1. A port development policy is not articulated presently. This should ensue from studies on potential harbor demand which identify the type and level of port activity desired by the city (see below).

2. The city should closely monitor the exploratory phase of OCS activity and be prepared to deal effectively with rapidly escalating land values and land rents, increased traffic congestion, a demand for temporary housing, and congestion in campgrounds.

The city's official land use plan map includes six categories. None of the categories mentions OCS exploration and development activities as being compatible land uses. During the OCS exploratory phase, certain onshore facilities, could, however, be inferred to be compatible with the city's plan. These could include offices, warehouses, open storage areas, helicopter landing sites, and water front docks for movement of goods. These OCS-related land uses during the exploration phase would be accommodated by the city's "Commercial," "Light Industrial," and "Water Dependent Industrial," land use Districts.

The city's plan includes a section entitled "OCS Development Energy Effects on Homer." This section acknowledges the uncertainties and difficulties of planning for OCS development in advance:

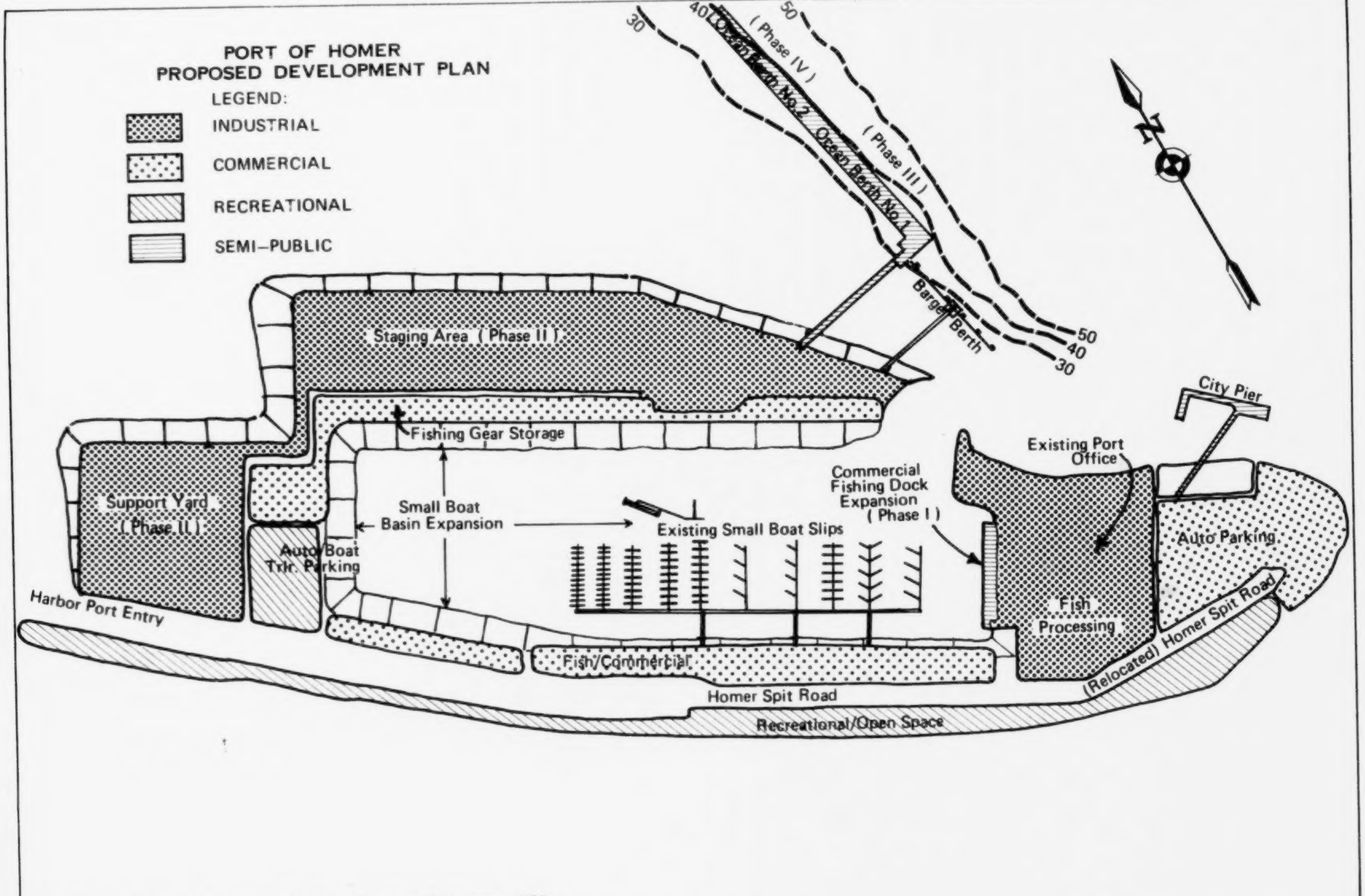
> "The absolute magnitude of the effects [of major intensive industrial development] is impossible to determine until information is available on the amount of oil and gas found and on the location and type of facilities planned by industry. Obtaining timely and accurate information from the industries involved may be a difficult or an impossible task, due to the competition between these corporate entities for land, facilities, services, and other unknown corporate factors. It is essential for the city to work with the companies to develop a means of obtaining timely data on their plans in order to develop city plans for increasing the benefits of any activities generated by OCS development in lower Cook Inlet (City of Homer, 1978)."

The city has separately sponsored a Port of Homer Development Plan (TAMS Engineers, 1980). This plan has been prepared subsequent to the adoption of the city's comprehensive development plan. The policies in it can be considered to be a more current statement of the city's views regarding siting of onshore OCS-related facilities; the proposed part development plan has not, however, been officially adopted by the city of Homer. This plan would include improvements beyond the Army Corps of Engineers' proposed expansion to the city's small boat harbor (U.S. Department of the Army, 1979). Refer to figure III.C.5.c.-3 for a depiction of the draft plan diagram. The plan consists of four phases.

A first phase would improve the existing commercial fishing dock by adding a new 230-foot dock and redeveloping the existing 160-foot dock. This phase would more than double the berthing capacity of the existing commercial fishing dock.

The second phase would expand the existing small boat harbor and create a surface berm area northeast of the boat harbor basin. The boat harbor would be expanded from 100 berths to 1,525 berths. The port development plan differs

FIGURE III.C.5.c.-3



PORT OF HOMER
PROPOSED DEVELOPMENT PLAN

LEGEND:
INDUSTRIAL
COMMERCIAL
RECREATIONAL
SEMI-PUBLIC
30
40
50
Ocean Berth No.2
(Phase IV)
Ocean Berth No.1
(Phase III)
Barge Berth
N
Staging Area (Phase II)
Fishing Gear Storage
Support Yard
(Phase II)
Auto Boat
Trlr. Parking
Small Boat
Basin Expansion
Existing Small Boat Slips
Commercial
Fishing Dock
Expansion
(Phase I)
Existing Port
Office
City Pier
Auto Parking
Fish
Processing
Harbor Port Entry
Fish/Commercial
Homer Spit Road
(Relocated) Homer Spit Road
Recreational/Open Space

Source: Tippetts – Abbett – McCarthy – Stratton, Engineers, 1980 from the COE boat harbor plan in that the berm width northeast of the basin would be enlarged from 225 to 585 feet. The port plan would use a level portion of the berm as a 30.5 acre staging area, cargo storage area, cargo marshalling area, and an auto parking area. The open end of the berm would access the phase III and IV improvements of the proposed port plans.

Phase III improvements would include a new ocean dock constructed at a 40-foot water depth (MMLW). A 600-foot trestle connecting the berm staging area with the ocean berth dock would be aligned in an easterly direction. The ocean berth dock would be 700 feet long and aligned northward, which is parallel to the 40-foot MMLW isobath and also aligned with the tidal flux. The ocean berth would include handling equipment for containerized as well as general cargo. The berth will accommodate major oceangoing vessels, large fishing vessels, the largest class OCS support boats, and rig tenders.

An optional Phase IV is planned if commercial marine traffic warrants the port development to this phase. This phase would add an additional 700-foot ocean berth to one end of the Phase III ocean berth dock. Also, a barge roll-on/roll-off and berth trestle would be constructed to accommodate the largest class of barges and oceangoing ferries of the Alaska Marine Highway system, i.e., 400-foot plus vessel lengths.

The development plan contemplates the first three phases of the improvements being constructed and completed in 4 years. The plan is predicated upon accommodating various types of marine transportation activity and goods movement needs of the city. The plan is specifically designed for OCS support base needs: The ocean berth dock would berth large support boats without interferences to commercial fishing operations which would be handled at a separate commercial fishing dock. The plan also sets aside an approximately 30-acre staging area for temporary storage and forwarding of all types of goods. Additionally, the plan establishes a 12-acre support yard and a relocation site for the existing petroleum product storage tanks.

City of Seldovia: The city of Seldovia recently revised its comprehensive master plan (Pacific Rim Planners, 1980). This plan was submitted to and adopted by the Kenai Peninsula Borough Assembly. Land use policies of the plan are to strengthen the waterfront commercial area, distinguish the waterfront-related commercial land use needs from other development needs, and siting residential and other land use development in suitable areas given the scarcity of lands not subject to building constraints.

The economic development policies of the plan are reflected in the types of industrial and commercial land uses allowed. The Seldovia Plan stresses bottomfishing capability and fish processing facilities, availability of additional sites for industrial land use, strengthening commercial activities, and providing a marine service function for offshore development. The plan indicates that OCS support and supply functions should not interfere with the existing economic base and community values. The city's land use plan diagram does not specifically identify industrial land use districts which are suitable for OCS support/supply functions.

Katmai National Monument: Both the existing and enlarged portions of the Katmai National Monument are the subject of an approved master plan (DOI, NPS, 1973). The plan sets forth a land use classification and a general development scheme which are based on NPS policy, landscape features, and proposed resource conservation of the area. Figure III.C.5.c.-4 reproduces the land classification diagram for the monument master plan. The primary objective for the plan is to "preserve the ecosystem in its natural state, and to provide the public with a rewarding park and wilderness experience" (DOI, NPS, 1973). Refer to section III.C.5.c. regarding NPS regulation of land uses in the enlarged portion of the monument. The plan generally allows recreation activity which preserves the wilderness and primitive character of the monument. Aircraft landing, motor boating, and sportfishing are regulated, allowed seasonally, and restricted to specific locations (30 CFR 7.46).

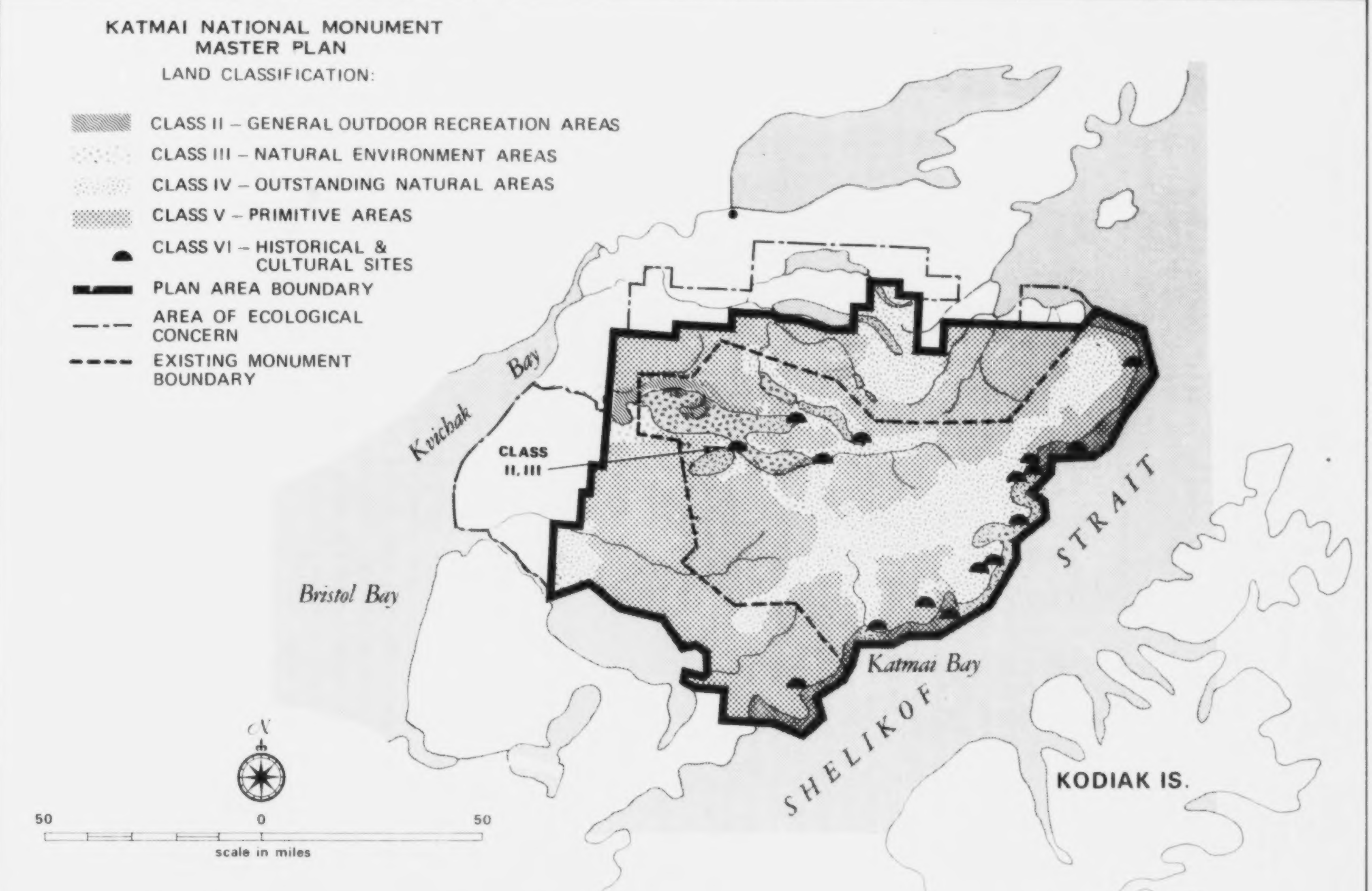
City of Port Lions: The city of Port Lions has adopted a comprehensive plan in 1975 (Galliett and Silides, 1975) for the incorporated area of the city. The plan evolved from earlier assistance in relocating the community of Afognak which was substantially damaged in the 1964 earthquake. The plan provides for residential, commercial, and industrial development. A schematic version of the Port Lions comprehensive plan is shown in figure III.C.5.c.-5. There are three subdivisions of land with vacant residential parcels available in Port Lions; the Port Lions townsite, the Wakefield subdivision, and the Port Lions subdivision-first addition. At the time of plan preparation, there were approximately 95 vacant and 50 improved residential parcels. Additional residential land has been identified and reserved in the General Plan (Wakefield Subdivision and Port Lions Subdivision-first addition.

Commercial land uses in Port Lions consist of relatively small parcels (approximately 1 acre) in the townsite and fronting on Settler Cove. The Peregrebni Peninsula includes a large area (approximately 60 acres) on the Kizhuyak Bay side which is designated for industrial land use. Other potential industrial land uses could be located along Airport Road and facing Settler Cove (personal communication, 1980).

The city plan does not include any official statement of goals or development objectives. Moreover, the plan does not indicate what types of land uses would be allowed in the respective land use districts. It has been informally determined that the Kizhuyak Bay side of the Peregrebni Peninsula is suitable for OCS port activity and a support and supply base (personal communication, 1980). However, the plan neither officially provides for nor precludes this type of industrial land use.

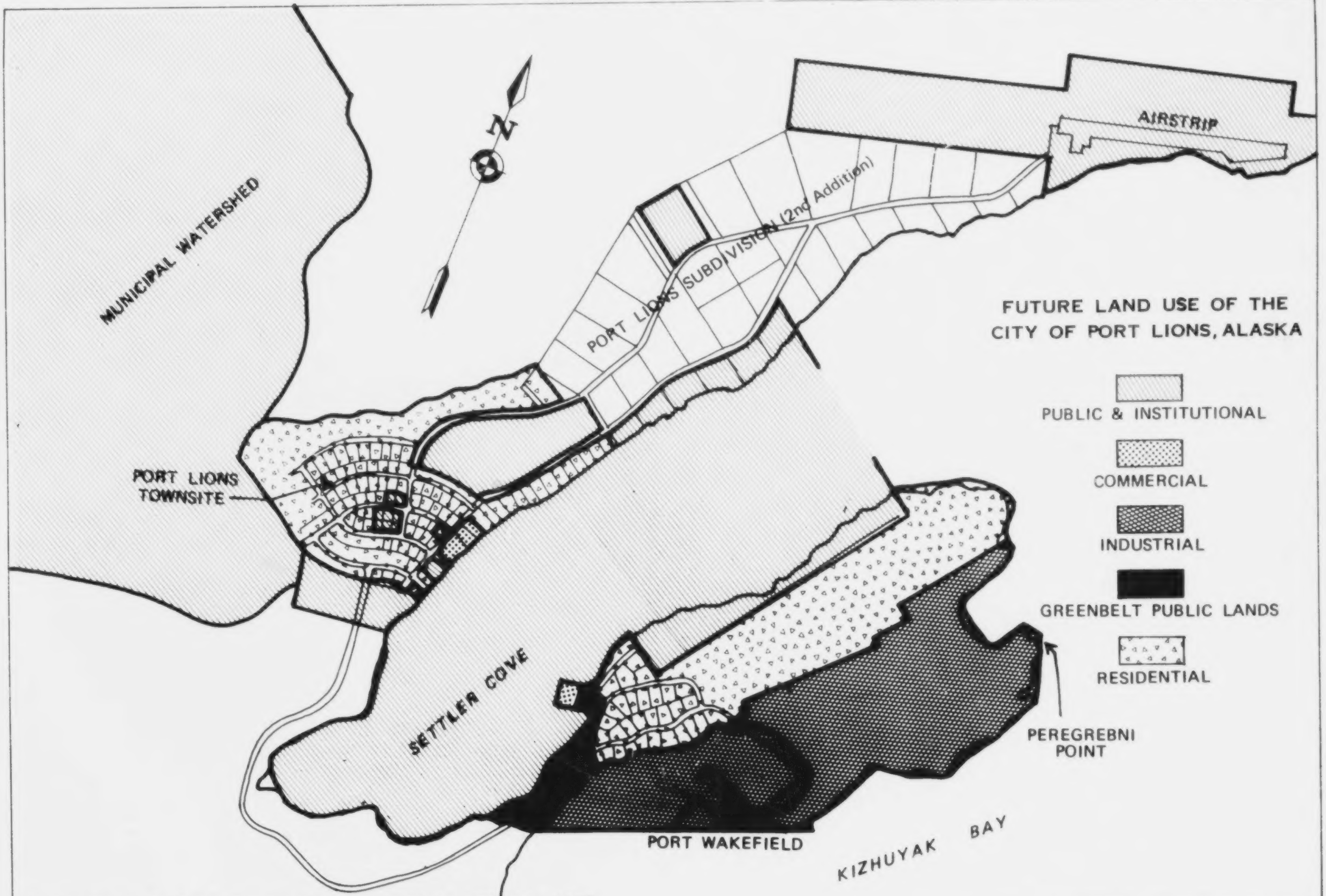
The city's plan has been amended a few times, and a zoning ordinance has been adopted to fix the types of land uses allowed. The Kodiak Island Borough has been requested by the city to update and revise its plan. The borough has submitted an application to the Alaska Department of Community and Regional Affairs for funding assistance for this purpose (personal communication, 1980).

FIGURE III. C. 5.c – 4


KATMAI NATIONAL MONUMENT
MASTER PLAN
LAND CLASSIFICATION:
CLASS II – GENERAL OUTDOOR RECREATION AREAS
CLASS III – NATURAL ENVIRONMENT AREAS
CLASS IV – OUTSTANDING NATURAL AREAS
CLASS V – PRIMITIVE AREAS
CLASS VI – HISTORICAL & CULTURAL SITES
PLAN AREA BOUNDARY
AREA OF ECOLOGICAL CONCERN
EXISTING MONUMENT BOUNDARY
Kvichak Bay
CLASS II, III
Bristol Bay
Katmai Bay
SHELIKOF STRAIT
KODIAK IS.
N
50
0
50
scale in miles

Source: U.S. National Park Service , 1973

FIGURE III. C. 5. c – 5



FUTURE LAND USE OF THE CITY OF PORT LIONS, ALASKA

MUNICIPAL WATERSHED
N
AIRSTRIP
PORT LIONS SUBDIVISION (2nd Addition)
PORT LIONS TOWNSITE
SETTLER COVE
PORT WAKEFIELD
KIZHUYAK BAY
PEREGREBNI POINT
PUBLIC & INSTITUTIONAL
COMMERCIAL
INDUSTRIAL
GREENBELT PUBLIC LANDS
RESIDENTIAL

Source: Galliett & Silides, Engineers & Surveyors; Alaska OCS Office, 1980

APPENDIX S

DESCRIPTION OF THE ENVIRONMENT
TRANSPORTATION

6. Transportation Systems: This section describes the transportation systems that could be affected by the proposed lease sale. The section will be divided into three parts. The first division will deal with the land, air, and water transport systems of potentially affected towns and cities located on the Kodiak Archipelago. The second division will treat the transport characteristics of the city of Anchorage. The third part will portray the existing state of the transportation systems in the Cook Inlet area.

a. Kodiak Archipelago: Port Lions, a major area considered for onshore development, lies some 26 air kilometers (17 mi) northwest of the city of Kodiak. The town has no overland communications with any other part of Kodiak and relies entirely on air and water transport for resupply and passenger movement.

Land Mode: The road system of Port Lions consists of 6.75 kilometers (4.19 mi) of improved dirt road and connects the town with both Port Wakefield and the airport.

Vehicle densities in Port Lions are extremely low. The State of Alaska has estimated that the average annual daily traffic for this roadway is approximately 20 vehicles. This figure is subject to extreme seasonal variations and is expected to be low as there appears to be a much higher degree of automobile ownership than is usually found among the citizens of isolated Alaskan towns.

Air Mode: Port Lions is serviced by a State-maintained 808 meters (2,650 ft) gravel runway which could be extended another 762 meters (2500 ft). However, some 305 to 457 meters (1,000-1,500 ft) of the extension would have to built into Kizhuyak Bay. The township receives scheduled flights by Kodiak-Western Airlines. Although Kodiak-Western attempts to maintain scheduled service, bad weather and low passenger numbers frequently cause flight cancellations. During 1976/1977, Kodiak-Western dispatched some 443 planes, 711 passengers, and one metric ton (1.12 tons) of freight to Port Lions.

Ground facilities at the Port Lions Airfield, including navigational aids, are entirely lacking. The airport, however, is surrounded by terrain which is flat enough to construct some hangers and a small supply yard.

Water Mode: The town of Port Lions is served by two docks. The largest pier (the former Wakefield Cannery dock) is an L-shaped structure which extends some 305 meters (1,000 ft) into Port Wakefield before assuming a right angle. The outer face of the cannery dock is some 122 meters (400 ft) in length while the length of the inner face is some 91 meters (300 ft). The maximum water depth along the cannery dock is some 22 meters (72 ft) at MLLW and occurs off the southern face. The cannery dock has about 1,487 square meters (16,000 ft^2) of usable working surface. It also contains a 2,500 lb hoist and a 167 square meter (1,800 ft^2) freezer storage room.

The second pier is a floating dock which is joined to the cannery dock. The floating dock provides 22 berths for fishing vessels with a total of 244 meters (800 linear ft) available for docking space.

Transient fishing vessels visiting Port Lions during the year may number as many as 127. Some 52 fishing vessels make the harbor a permanent home (Corps of Engineers, June 1977).

The town of Port Lions is also a scheduled stop on the route of the M/V Tustamina, a ferry of Alaska Marine Highway System. The M/V Tustamina provides passenger and freight connections between Port Lions, Kodiak City, and the Alaska mainland.

The U.S. Army Corps of Engineers has planned to expand the small boat harbor of Port Lions to provide more berths for fishing vessels and to take some of the vessel traffic pressure off of the Kodiak small boat harbor. For a more detailed discussion of this proposed action, the reader is directed to the appropriate portions of section IV.A.1.f.

Talnik Point is situated about 4 kilometers (2.4 mi) north of Port Lions. The point is located on Kizhuyak Bay, a tributary to the larger Marmot Bay region. Water depth immediately off Talnik Point falls to 18.3 meters (60 ft). Two kilometers (1.2 mi) east of Talnik Point, water depth is 91.4 meters (300 ft). The water depth continues to increase toward the mouth of Marmot Bay, eventually reaching 183 meters (600 ft). South of Talnik Point, water depth is 18.3 meters (60 ft) until Peregrebni Point. There depths are 9 to 12 meters (30-40 ft).

Kizhuyak Bay is some 8 kilometers (5 mi) wide near its mouth and narrows to 2.4 kilometers (1.5 mi) near Peregrebni Point. Navigation from the Marmot Bay entrance to Talnik Point is free of major submarine hazards; however, rocky shoals are in abundance along the eastern side of Kizhuyak Bay.

Whale Passage and Kupreanof Strait are two ajoined bodies of water which function as the primary marine route for fishing vessels traveling between Marmot Bay and the Shelikof Strait. Tidal currents in Whale Passage (near Bird Point) run between a flood tide of 4.4 knots and an ebb tide of 5.2 knots. For Kupreanof Strait (off Chernoff Point), the tidal currents vary between a flood tide of 2.2 knots and an ebb tide of 1.5 knots.

The Coast Pilot 9 (U.S. Department of Commerce, 1979) urges caution for all mariners using Whale Passage, even if favorable climatic conditions exist. Transiting Whale Passage during periods of maximum current is to be avoided as floating aids to navigation could be dragged off station. Navigation within the Kupreanof Strait is not as difficult as it is in Whale Passage. The Strait is between 2.9 and 4.9 kilometers (1.8-3 mi) wide. The mid-channel of Kupreanof Strait is more than 18 meters (60 ft) deep and is free of hazards. However, there are several shoal areas along the shores and movement within the strait should be avoided during storms.

The U.S. Army Corps of Engineers set up an anemometer at Port Lions in 1971, which collected wind data until 1975. Some of this data has been interpreted. Peak wind gust observed during the monitoring period was 91 kilometers per hour (57 mph) at 090° in February of 1975. Maximum sustained wind velocity was observed during January of 1974. The wind registered 64 kilometers per hour (40 mph) at 100° for 16 days (Eckert, 1980). The bulk of the data, however, has been stored by the Corps and is awaiting the funding necessary for interpretation.

In regard to wind and wave actions around Talnik Point, local individuals queried indicated that the point was far more exposed to northern weather than Port Lions and that wind and wave action was such that a major facility built near Talnik Point would require a breakwater.

Ouzinkie: The fishing village of Ouzinkie is located on Spruce Island along Narrow Strait. Ouzinkie has only a rudimentary transportation infrastructure. The road system of the village consists of about 5 kilometers (3 mi) of borough-maintained, improved dirt road. The village has no airstrip. Passengers and freight enter and leave the village via Kodiak-Western seaplanes.

Ouzinkie's small dock is about 34 meters (104 ft) long and has 90 meters (280 ft) in depth along the face. Nearshore bathymetry indicates that the facilities at Ouzinkie could be expanded to accommodate deep draft vessels. But the confined nature of Narrow Strait would hinder the movement of large tankers.

Kodiak City: For further information about the transport systems of the subject area the reader is directed to graphic 9 of the DEIS released for the OCS lease sale 46 which was to occur in December 1980. For another discussion of the issue, attention is directed to the initial sale 46 DEIS published in 1977.

b. Anchorage: The city of Anchorage is the primary transportation center in Alaska. It is an important stop for the Alaska Railroad; it has access to a major north-south, year-round highway; it is serviced by an international airport; it has the State's most extensive dock facilities; and it has the largest market area in the State. Any development activity that occurs within Alaska will probably affect the social, economic, and transportation systems of the city of Anchorage.

Land Mode: The road system of the city of Anchorage contains about 1256 kilometers (780 mi) of municipal and State maintained roads and is sufficiently viable to allow an average volume of traffic to flow without difficulty. However, once beyond the metropolitan area, truck and automobile traffic travelling south may be subject to man-made and natural events which can result in considerable time delays.

Due to the rising volume of traffic passing between the Kenai Peninsula and the city of Anchorage, the State of Alaska has been attempting to improve the carrying capacity of the Seward Highway, particularly that section of roadway between Girdwood and the edge of metropolitan Anchorage. In 1978, the State began an extensive construction effort to improve the Seward Highway between miles 111 and 115. This construction project will be completed in July 1980. Average Annual Daily Traffic (AADT) figures for the Seward Highway at mile 115 (just as it enters metropolitan Anchorage) have risen from 1,929 in 1970 to 3,340 in 1979. AADT figures for this traffic point are seasonally variable and range from a July (1979) high of 5,896 vehicles to a January (1979) low of 1,989 vehicles. Truck and bus traffic constitute only 6 percent.

Apart from the delays which would arise during periods of peak summer recreational use, east and west bound truck and bus traffic using the Anchorage-Girdwood link encounter few obstacles to the maintenance of timely schedule. However, this section of road is prone to avalanches which may close the road during spring for over a week at a time.

Air Mode: The Anchorage International airport handled 236,000 operations (landings and take-offs) in 1976 which is 77 percent of the capacity estimated in the 1971 Master Plan. The primary purpose of the new north-south runway, presently under construction, is to provide a runway capable of accommodating larger jets in cross-wind conditions and to alleviate aircraft noise east of the airport by placing the majority of aircraft operations over water. The completed runway will also raise the airport operational capacity to 334,000 operations, a 9 percent increase. The runway will be used for air carrier arrivals and one of the east-west runways will be used for air carrier departures. The three existing asphalt runways include two that are greater than 3,048 meters (10,000 ft) in length.

The facility serves an important role in moving freight and passengers to, from, and within Alaska. In 1976, throughput tonnage of the airport amounted to 107.8 thousand metric tons (118.8 thousand tons). This was 11.1 percent of the Port of Anchorage's throughput for general cargo in that year. Transshipment by Wien, and to a lesser extent, Northern Air Cargo, Alaska International Air, and Great Northern of goods arriving in Anchorage by the water mode to remote Alaskan communities accounts for outbound tonnage being 50 percent greater than inbound tonnage at the airport.

Water Mode: The Port of Anchorage consists of four terminals owned and operated by the Municipality. These terminals serve deep-draft ships and six private docks which serve specialized barge shipments.

Handling equipment available for the general cargo terminals includes two 24.9 metric ton (27.5 ton) container-handling cranes and four level-luffing gantries with 36.3 metric ton (40 ton) capacities. Two portable transfer ramps for roll-on/roll-off operations are also available.

Scheduled for construction in 1980 by York Steel Company on land leased from the Alaska Railroad is a port facility that will provide a transfer dock for rail barges, rail spurs, warehouses for carge storage, and a repair facility for large boats. As part of the project, a rail-barge facility might also be built north of Nikiski on the Kenai Peninsula.

The dock face of the public terminals is maintained to a depth of 10.7 meters (35 ft) mean lower low water (MLLW) by the Corps of Engineers. Statutory responsibilities of the Corps of Engineers usually are limited to channel dredging near ports, but the Port of Anchorage benefits from special Congressional legislation which enables dredging by the Corps alongside the dock. During 1978, three separate dredging operations were necessary to maintain adequate depth for deep-draft vessels. The private docks are limited to ships having a draft of 6.1 meters (21 ft) or less.

The extreme tidal range of 12.7 meters (40.7 ft) creates high mid-stream velocities and eddy currents along shore, but these conditions have little effect on deep-draft vessels. Shoaling occurs west of Point Woronzof near Fire Island and limits the channel width for deep-draft vessels to 610 meters (2,000 ft). Four groundings occurred in this general area during the late 1960's. None produced serious consequences.

A review of table III.C.6.b.-1 indicates that both in terms of vessel arrivals and cargo throughput, activity at the port of Anchorage has declined during the last 4 years. In 1976, arrivals from the port of Anchorage numbered 792 vessels. By 1979, vessel arrivals had declined to 410, largely due to the cooling of the Alaskan economy and by the construction of a 36,000 barrels/day pipeline from the Nikiski Tesoro refinery to the city of Anchorage.

Table III.C.6.b.-1
Port of Anchorage-Historical Summary

Year	Metric Tons	(Tons)	Year	Metric Tons	(Tons)
1969	1,639,642	(1,807,405)	1975	2,663,625	(2,936,159)
1970	1,757,186	(1,936,976)	1976	2,660,276	(2,932,468)
1971	1,616,653	(1,782,064)	1977	2,040,300	(2,267,000)
1972	1,867,157	(2,058,199)	1978	1,866,145	(2,073,498)
1973	2,381,132	(2,624,763)	1979	1,504,007	(1,671,719)
1974	2,122,965	(2,340,181)			

Source: U.S. Department of the Army, Corps of Engineers, 1980.

Navigation in upper Cook Inlet during the winter is complicated by the absence of buoys, which are removed by the Coast Guard when ice conditions commence.

Except for liquid bulk commodities and bulk cement, no single commodity stands out. Shipments that can be contained make up 42 percent of the inbound tonnage and 73 percent of the outbound tonnage. The Port of Anchorage is the State's major port of entry for containerized freight. The large ships that carry containers and trailer vans are able to operate to the port throughout the year unlike tugs and barges.

The Port of Anchorage's ability to attract frequent year-round service by two carrier handling containers and vans that can be efficiently loaded and unloaded has made it Alaska's premier port of entry. In 1976, it handled over three times as much tonnage as Whittier, over five times as much as Valdez, and over 13 times as much as Seward, despite weather and shoaling constraints. The port has adequate staging areas at present, but geographical constraints prevent a major site expansion. The additional 6.9 hectares (17 acres) which is available will require expensive site improvements because of drainage problems.

c. Cook Inlet:

Land Mode: Primary vehicle routes serve the major centers of the Kenai Peninsula and connect them with southcentral Alaska. Unlike the western shore of the inlet, which has no roads, potential oil and gas facility sites on the Cook Inlet portion of the Kenai Peninsula are all located near primary vehicle routes.

Much of the existing highway of the Kenai is currently being used to near capacity and should be upgraded. Table III.C.6.c.-1 shows that some 60 percent of the principal routes operate at between 65 and 73 percent of capacity. Additionally, those links operating at high capacity levels are in need of improvement along 70 percent of their length.

In the 5-year period ending in 1978, annual average daily traffic (AADT) figures for the Kenai Peninsula road system have shown a sharp increase, with the largest increase occurring from Soldotna to the Sterling Highway junction. Truck and bus traffic are an important component of the Kenai Peninsula traffic. Truck and bus traffic entering the Kenai-Nikiski area equal approximately 10 percent of all vehicular traffic.

As would be expected, seasonal traffic variations are pronounced. Summer AADT are 150 to 200 percent of the yearly mean AADT. Winter AADT volumes are 9 to 65 percent of the yearly mean AADT estimates.

Kenai Peninsula traffic should, over the short-term, continue to increase. The proposed expansion of Homer's fishing industries, the construction of the Pacific LNG Plant, the traffic resulting from the Bradley Lake Hydroelectric project, as well as the peninsula's continued attraction to recreationalists, will ensure the accelerated use of the Kenai roadways despite any pending energy problems.

Homer Air Mode: The Homer airport runway, which measures 2256 meters (7,400 ft) long by 45.7 meters (150 ft) wide, parallels the shoreline and allows

Table III.C.6.c.-1
Traffic and Road Conditions For Kenai Peninsula Primary Routes 1/
1977

	Distance Km (Mi)	Capacity Vehicles/ Hour 2/	30th Highest Hour	Peak Hour Factor 3/	Volume/ Capacity 4/	Deficient Miles 5/	Five Year Summary Of AADT 6/	
Homer-Ninilchik	56.6 (35.2)	730	268	0.21	0.37	0%	1974	1,130
							1975	1,215
							1976	1,325
							1977	1,453
							1978	1,400
Ninilchik-Soldotna	60.0 (37.3)	766	268	0.21	0.35	0%	1974	1,095
							1975	1,179
							1976	1,285
							1977	1,278
							1978	1,698
Soldotna-Sterling Highway Junction	94.3 (58.6)	484	316	0.13	0.65	70%	1974	1,484
							1975	1,723
							1976	2,155
							1977	2,519
							1978	2,537
Sterling Highway Juntion-Girdwood	84.7 (52.6)	495	149	0.25	0.73	72%	1974	1,422
							1975	1,594
							1976	1,552
							1977	1,453
							1978	1,719

1/ Traffic figures from fixed traffic recorder stations within or near route segments.
2/ Capacity derived from "1972 Sufficiency Rating Report," Alaska Department of Highways.
3/ Peak hour factor = (30th highest hour)/AADT.
4/ Volume/capacity = (30th highest hour)/capacity.
5/ Deficiency is the rating valve established by the State as the point at which improvements should be considered.
6/ AADT = Average annual daily traffic.

Source: Peter Eakland and Associates, 1978.

overwater approaches from both directions. (The airport is owned and operated by the State of Alaska; the Federal Aviation Administration owns adjacent land that would have to be acquired for expansion to take place.) An adjacent float plane facility at Beluga Lake has a 914-meter (3,000 ft) runway (tables III.C.6.c.-2 and -3).

Two scheduled carriers serve Homer. The community is an intermediate stop for Wien's 737 jet flights between Kodiak and Anchorage. During the year ending June 30, 1977, Wien completed only 76.9 percent of its scheduled flights to Homer. It is also the southernmost destination of Alaska Aeronautical Industry's (AAI) commuter route from Anchorage that serves Soldotna and Kenai. The airport is also served by both fixed-wing and rotary-wing air taxi operators. Several additional rotary-wing operators provide services on contract to offshore oil operators.

The Alaska Department of Transportation has forecast a steady 7-percent annual growth in operations at the facility for the next 20 years. A draft airport development plan has been prepared to address existing and future problems.

Presently, the terminal facilities and adjacent parking are inadequate but they cannot be expanded at the present location. The terminal is closer to the runway than FAA regulations permit, and height restrictions are also violated. The existing terminal, which is owned by Wien Air Alaska, has seating capacity for only ten persons. These circumstances make it difficult to provide adequate security. Parking is limited to 28 vehicles. The recommended plan is to move the terminal and air carrier operations to the north side of the runway. Facilities on that side would include a perpendicular taxiway to an apron, a heliport for large helicopters, and parking for 50 vehicles.

Kenai: Landing facilities at the Kenai Airport consist of an asphalt runway, which is 2286 meters (7,500 ft) long by 45.7 meters (150 ft) wide, and a parallel float plane basin 762 meters (2,500 ft) long (tables III.C.6.c.-2 and -3). The airport has adequate approach and landing aids to handle foreseeable operations, including a control tower and a glide slope. The practical annual capacity is 210,800 operations.

The Kenai facility currently receives two scheduled carriers with permanent operating authority, AAI and Wien. AAI is a commuter airline and offered 30 flights per day to Kenai in the summer of 1979, three of which were exclusively for freight. Commuter airline flights have increased from 9 in 1971, to 19 in 1976, and finally, to the present 30. The fish processing industries of Kenai combined with large salmon catches in Western Alaska produced, in 1979, the frequent landings of large cargo aircraft. Whether this situation continues in the future is open to debate; however, local officials have requested the FAA to design five tie-down spaces for C-130 aircraft.

Kenai will continue to be an active market for commuter airline services. The construction of the Pacific LNG plant, as well as the city's existing oil and gas industry, should produce a volume of passengers sufficient to sustain a high frequency of scheduled commuter airline service.

Soldotna: Soldotna Airport, a general utility airport, is located on the southeast corner of the town (tables III.C.6.c.-2 and -3). It has a 1,524-meter

Table III.C.6.c.-2

Lower Cook Inlet Principal Airports - Runways and Ground Facilities

Community	Location	Owner	Runway Heading (1)	Length Meters (ft)	Width Meters (ft)	Surface Type	Heliport (2)	Terminal Building	Hangers	Fuel	Maintenance
Homer	2½ Mi. east of downtown Homer	State of Alaska	3-21 3-21	(7,400) (3,000)	(150) (600)	Asphalt Water	No	Yes	Yes	Yes	Yes
Kenai	½ mi. north of downtown Kenai	City of Kenai	1-19	(7,498)	(150)	Asphalt	No	Yes	Yes	Yes	Yes
Soldotna	2 mi. south of downtown Soldotna	City of Soldotna	7-25	(5,000)	(150)	Asphalt	No	Yes	Yes	Yes	Yes
---	Drift River	Cook Inlet Pipeline Company	5-23	(4,300)	(150)	Gravel	Yes	Yes	Yes	No	No

Notes: (1) Headings are expressed in true compass readings. For example, runway 3-21 has a heading of 30° or 210° depending upon the direction of a plane when landing or taking off.

(2) Although not all airports listed have designated heliports, each has at least one operator who uses helicopters and who has a private area for operating them from.

Source: FAA, 1977, and Peter Eakland and Associates, 1980.

Table III.C.6.c.-3
Lower Cook Inlet Principal Airports - Operations and Aids

									Navigation/Landing Aids (4)			
Community	Service Level (1)	Design Type (2)	Total Operations	Based Aircraft (3)	Scheduled Airlines	Based Air Taxis	Control Tower	Taxiways	Runway Heading	Lighting	Radio	Other
Homer	AC	AC	37,198 (1977) 36,760 (1978)	65	2	3	No	Yes	--- 3 3/21 21	 MALS VASI REIL	VORTAC DF, FSS, NDB LOC/DME	RCAG
Kenai	CS	GT	89,965 (1977) 87,425 (1978)	110	2(5)	5	Yes	Yes	--- 19 1 1	 MALS REIL VASI	DF, FSS, NDB, VOR/DME GS, LOC MM, OM	
Soldotna	GS	GU	66,000 (1978 est.)	125	3	No	Yes	---			SFO	---
Drift River	Private	Private	Fixed Wing - 750 (1977 est.) Rotary Wing - 1,600 (1977 est.)	3	0	0	No	No	---	Rotating Beacon	---	---

Notes: (1) ervice Level
C = Air Carrier (Certified Service)
L = Air Carrier (Intrastate Qualifications)
S = Commuter Service
A = General Aviation

Table III.C.6.c.-3--Continued

(2) Design Type
AC : Air Carrier (Certificated Service)
AL : Air Carrier (Intrastate Qualifications)
GU : General Utility
BT : Basic Transport
SP : Seaplane Base

(3) FW : Fixed Wing; RW = Rotary Wing.

(4) Lighting: MALSR = Medium intensity approach lights with RAIL: REIL = Runway end identification lights; RVR = Runway visual range; VASI = Visual approach slope indicator.

Radio: ASR = Airport surveillance radar; DF = Direction finder; DME = Distance measuring equipment; GS = Glide slope; LOC = Localizer; NDB = Non-directional radio beacon; PAR = Precision approach radar; SFO = Single frequency outlet; VORTAC = Combined VOR and TACAN (TACR).

Other: ATCT = Air traffic control tower; FSS = Flight service station; MM = Middle marker; OM = Outer marker; RCAG = Remote control air ground facility; RCO = Remote communications outlet (FSS).

(5) A third carrier, Polar Airlines, was granted an emergency exemption to provide Anchorage-Kenai service for 120 days from May 29 - September 26, 1979.

Source(s): FAA, 1977; DOTPF, 1978; Peter Eakland and Associates 1980.

(5,000-ft) by 46-meter (150-ft) asphalt paved runway with an estimated pavement strength of 32000 kilograms (70,000 lbs) gross weight. AAI now makes three daily round trips between Soldotna and Anchorage with an intermediate stop in Kenai except for Saturday and Sunday.

The computed annual capacity of the airport is 150,000 operations, and the computed hourly capacity is 110 operations. The city of Soldotna records 125 aircraft being based at the airport in 1978, a 71 percent increase from the 73 planes recorded in 1973. During the winter, one runway is left unplowed which allows for the use of planes fitted with skis. During 1978, an estimated 103546 kilograms (228,277 lbs) of cargo was handled at the airport and an additional 36511 kilograms (80,491 lbs) of mail.

The 10-year National Aviation System Plan (FAA, 1977) includes recommendations to expand and pave an existing apron and runway, construct and pave a new apron, add new approach aids such as VASI and REIL, and improve existing buildings.

Homer Water Mode: Existing port facilities are located toward the end of the Homer Spit on the Kachemak Bay (north) side. The Homer City pier, which extends 140.2 meters (460 ft) from shore, serves deep-draft vessels. It has three docking faces. The largest face is 125 meters (410 ft) long and has water depth alongside of 7.6 meters (25 ft). Its northwest section is 8.8 meters (32 ft) wide and the southwest section 18.3 meters (60 ft) wide. The M.V. Tustemena, of the Alaska Marine Highway System, has preferential berthing privileges at this facility. It is also used for shipment of fish products, occasional freight barges, and the receipt of petroleum products from the Standard Oil tanker, Alaska Standard. Supply boats serving offshore drilling activities have used the facility to load fuel and water. Water is available at the pier, but diesel fuel and gasoline supplies must be delivered by truck. A truck-mounted crane is available from a local contractor for onloading and offloading heavy cargo.

The northwest face, which is 42.7 meters (140 ft) long and 8.8 meters (32 ft) wide, is used for mooring the Coast Guard buoy tender, CGC Sedge. It has a 4.0-meter (13-ft) draft. The southeast face, 18.3 meters (60 ft) long, has a draft of 3.7 meters (12 ft) and is used principally by fishing boats.

The access channel receives annual maintenance dredging but no dredging has taken place within the basin since 1964.

The 42.7-meter (410-ft) face of the city pier, with its 7.6 meters (25 ft) of water, can handle ocean-going barges and small tankers, but dredging would be required for ships of the size operated by TOTE and Sea-Land into Anchorage to use the facility. Supply boats would be unable to use facilities in the small boat harbor basin because of water depth and inadequate room for turning maneuvers. The industrial park will primarily serve fishing vessels, as indicated by the design depth of the access channel.

The entrance to Kachemak Bay is rich in seafood resources, and a conflict between marine shipping and fishing interests exists. This area must be crossed by ships picking up and discharging pilots. Increased vessel traffic in Cook Inlet brought a corresponding increase in damage to fishing gear. The Coast Guard cooperated with the pilots and the fishermen in establishing a voluntary vessel separation scheme, which has been in operation since 1976 (fig. III.C.6.c.-1.). Lanes from both the north and the south are provided. A move to make the vessel separation scheme permanent has been urged by some fishermen. Crabbers have suggested the use of only a single lane in order to expand their crabbing area. The Coast Guard feels that the voluntary system has worked well and that it is preferable to a permanent system due to its flexibility.

Ice does not present a major problem to vessel operations in the Homer area, but ice floes can interfere with operations at the Homer City pier from January to March. If the floes are particularly heavy, cargo barges can use a wharf in the small boat harbor.

The historical figures for throughput tonnages, as shown on table III.C.6.c.-4 for the years 1966 to 1977, show an erratic pattern of tonnage handled. This is because in some years large shipments of a particular product such as sand, gravel, crushed rock, lumber, nitrogenous chemical fertilizer, or gasoline dominated the tonnage. If these large tonnages of particular products are removed, it is seen that Homer consistently handles 15,000 metric tons (16,500 tons) or less of goods per year through its port.

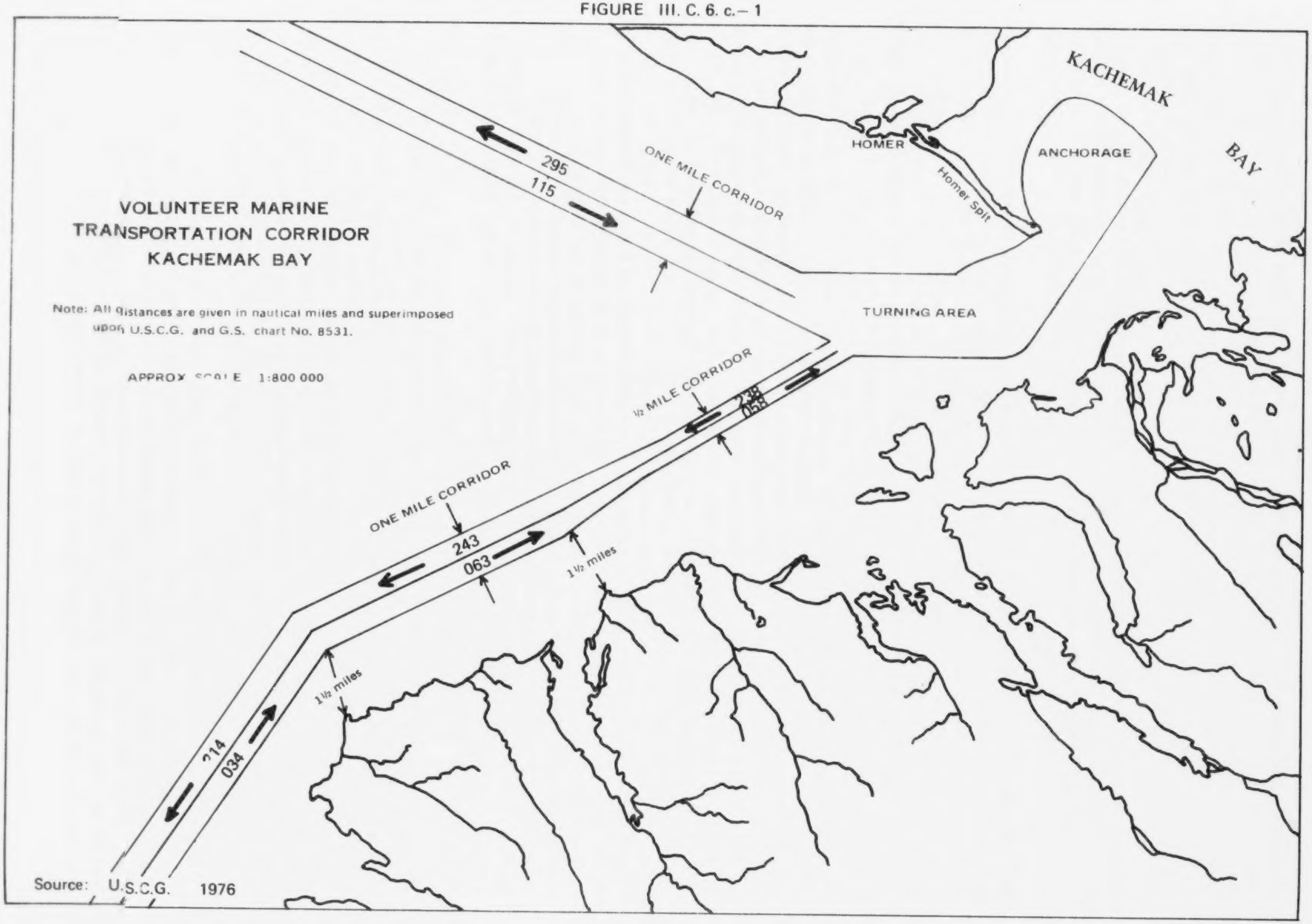
Drift River - Nikiski: Imports from foreign ports, mainly petroleum products, accounted for 64 percent of total inbound tonnage in 1977. Valdez shipped 28 percent of total petroleum and coal products imported. Tonnage from Kodiak to Homer consists of diverse products and accounts for 5 percent of tonnage imported into Homer. Of the outbound tonnage reported, 97 percent is shipped to foreign ports and consists mainly of lumber and chemicals and allied products. The remainder of outbound shipments in 1977 had diverse destinations such as Seattle, Kodiak, Sitka, and the Alaska Peninsula.

Three separate groupings of facilities are discussed in this section--Kenai, Drift River, and Nikiski. Only those in Kenai are available for public use. Geographically, the ports of Kenai-Nikiski and Drift River are separate, but the Corps of Engineers' waterborne commerce statistics treat them as a single reporting unit. Drift River is located north of Kenai on the west side of Cook Inlet and Nikiski is located on the east side, north of Kenai. Kenai facilities include five wharves on the Kenai River, three of which are owned and operated by seafood companies.

The two facilities on the Kenai River which receive general freight are the city dock, owned by the city of Kenai, and the Port of Kenai wharf, which is privately owned. The city dock consists of a single 30.4-meter (100-ft) long bulkhead (concrete wall) which has been backfilled. The draft at this port is only 0.3 meters (1 ft) at low tide, which limits its use to barges. Principal products received include drilling mud and other petroleum industry supplies. Winter ice conditions limit use of the facility to approximately 318 days (Federic Harris, 1978). The Port of Kenai wharf is located 403 meters (550 yds) from the city dock. It has a 111-meter (365-ft) face and receives construction materials and general cargo.

Nikiski and Drift River are specialized ports serving the oil and gas industry. Nikiski has three deep-draft loading docks and one shallow-draft facility. In addition to these, there is the Arness dock which consists of three World War II liberty ships sunk in low water so as to provide a breakwater and mooring surfaces for barges supporting offshore drilling operations.

FIGURE III. C. 6. c.– 1



VOLUNTEER MARINE
TRANSPORTATION CORRIDOR
KACHEMAK BAY

Note: All distances are given in nautical miles and superimposed upon U.S.C.G. and G.S. chart No. 8531.

APPROX SCALE 1:800 000

KACHEMAK
BAY
HOMER
Homer Spit
ANCHORAGE
TURNING AREA
ONE MILE CORRIDOR
295
115
½ MILE CORRIDOR
238
058
ONE MILE CORRIDOR
243
063
1½ miles
1½ miles
214
034

Source: U.S.C.G. 1976

Table III.C.6.c.-4
Vessel Trips, Passengers and Throughput Tonnage - Homer

Year	Vessels	Passengers	Metric Tons
1966	676	2,328	12,529
1968	586	3,123	15,807
1970	2,337	5,074	172,136 (1)
1972	2,871	7,052	154,567 (2)
1974	142	10,511	10,831
1975	1,217	11,215	35,633 (3)
1976	138	10,869	27,906 (4)(6)
1977	162	9,559	107,564 (5)(6)

Notes: (1) 150,773 metric tons (166,200 tons) = sand, gravel, and crushed rock.

(2) 36,903 metric tons (40,679 tons) = logs; 97,182 metric tons (107,126 tons) = rafted logs.
(3) 21,452 metric tons (23,647 tons) = gasoline.
(4) 13,564 metric tons (14,952 tons) = nitrogenous chemical fertilizer.
(5) 52,009 metric tons (57,331 tons) = nitrogenous chemical fertilizer; 26,922 metric tons (29,677 tons) = kerosene; 10,587 metric tons (11,760 tons) = logs.
(6) Chemical fertilizer, although included in totals for Homer, originated at Nikiski. Homer is listed because it was the last port-of-call before a vessel sailed to a foreign port.

To obtain short tons, multiply metric tons by 1.1.

Source: Department of the Army, Corps of Engineers, 1966-1977.

The rig tender's dock (Port Nikiski) consists of a backfilled concrete bulkhead and is designed primarily to handle barges and small offshore platform service vessels. It has a 182.9-meter (600-ft) face with a 3.04-meter (10-ft) draft alongside. The two side faces of the dock are 137.2 meters (450 ft) long, and draft ranges from zero at the shore side to 3.0 meters (10 ft) at the inlet side.

Eight acres of landside storage area are available. Shore facilities include crawler cranes with 136 metric tons (150 tons) capacity, storage stations for bulk mud and bulk cement, and machine shops. Also, there are five fuel and water transfer stations designed for use by supply boats. The facility receives inbound barge freight, accommodates loading of supply boats, and is used by Tesoro for the loading of refined petroleum products into barges. The Tesoro traffic has diminished with the construction of the petroleum products pipeline to Anchorage. The rig tender's dock was built by Crowley Maritime for the dedicated use of the oil industry. Conversion to a public use facility would not occur without the concurrence of current users.

The three offshore loading docks are the Standard Oil of California (also known as Kenai-Pipe Line Company dock), the Phillips-Marathon, and the Collier docks. The Standard dock (Nikiski Wharf) is of steel pile and concrete construction. It has berthing space of 399.1 meters (1,310 ft) with draft alongside of 14.6 meters (48 ft). It is connected to the shore by one 61-centimeter (24-in) pipeline to an 800,000-barrel storage facility; one 50.8-centimeter (20-in) and two 35.6-centimeter (14-in) pipelines to another 800,000-barrel storage facility; and one 50.8-centimeter (20-in) pipeline to 323,000-barrel storage facility. Tankers supplying oil to the Standard Oil and Tesoro refineries dock at this facility.

The Phillips-Marathon dock (LNG Dock) located south of the Standard Oil dock is constructed of sheet piles and concrete and has a length of 320 meters (1,050 ft). It serves ships taking on LNG shipments. The draft alongside this dock is 12.2 meters (40 ft). It is connected to the shore with one 61-centimeter (24-in) LNG line to 225,000-barrel storage capacity and one 50.8-centimeter (20-in) and one 4016-centimeter (16-in) petroleum line to a 450,000-barrel storage facility.

The Collier Company dock (Collier Chemical Dock) is constructed of steel piles and concrete and the berth has a length of 333.8 meters (1,095 ft). The draft alongside the berth is 12.2 meters (40 ft). There is a 113,397-metric ton (125,000-ton) capacity for storing bulk urea. This dock is connected by pipeline (one 30.5 cm (12 in) connecting to two 15.2 cm (6 in)) to a facility for storing anhydrous ammonia, whose capacity is 54,431 metric tons (60,000 tons) at -33.3° C (-28° F). Further, there are two pipelines, 25.4 centimeters (10 in) and 20.3 centimeters (8 in), which feed petroleum to a 171,000-barrel storage facility.

The Drift River Terminal, built in 1966 on the west side of Cook Inlet, has an offshore loading platform equipped with breasting and mooring dolphins. Dolphins are groups of piles, placed to both sides of the end of a pier for either fastening mooring lines or for resting the ship itself (breasting dolphins). Alongside the platform it has a draft of 18.2 meters (60 ft) and is capable of handling tankers up to 149685 dead weight metric tons (150,000 dead weight tons). There are two 76.2-centimeter (30-in) pipelines leading to an onshore tank farm for storing crude oil.

Two dock facilities will be constructed as part of the Pacific-Alaska LNG project, which will be located south of the existing Collier property. First, a construction dock will be built with 152.4 meters (500 ft) of berthing area to accommodate large ocean-going barges carrying plant modules. Interest has been expressed by Kenai in later using this facility for receiving general cargo. To serve LNG ships, a pier 671 meters (2,200 ft) long will be constructed to a mooring facility consisting of six dolphins (Federal Power Commission, 1976). Some dredging will be required on the south side of the docking area.

Table III.C.6.c.-5 shows the high and low capacity available at the ports of Kenai-Nikiski-Drift River by handling categories. The table also shows 1977 inbound, outbound, and throughput tonnages through these ports. From these figures it can be seen that considerable additional capacity exists for handling oil and gas products at these ports. During 1977, some 578 oil tankers and barges arrived in the Port of Nikiski-Drift River.

Water depth at the Port of Kenai is only 1 foot deep at low tide. Water depth at Nikiski and Drift River facilities is sufficient to handle medium-size tankers.

Freezing occurs in the Kenai River from mid-December to the first of April. Because of tidal currents and numerous shoal areas in Cook Inlet, pilots are required for deep draft ships destined for Nikiski, as well as other ports north of Homer. The annual average number of days available for shipping is 300 at Nikiski, Drift River Terminal, and the Arness dock, and 318 on the Kenai River (Harris, 1978).

An area extending from 40 yards to several hundred yards north of Nikiski dock has rocks. A shoal area about 5 miles in extent is 3.2 kilometers (2 mi) off the dock and is marked by a buoy.

Navigational difficulties and hazards to vessels in the Kenai-Nikiski area are due more to current and ice than storms and water depth. High tidal fluctuations produce strong currents which reach 8 to 11 knots in Cook Inlet and up to 6 knots at Nikiski docking areas. Drift River is adequately protected by the West Forelands from ice and current on the ebb tide. Deep water, wide shipping lanes, the required use of pilots on vessels above 272 gross metric tons (300 gross tons), and the relatively small level of vessel traffic make navigation safe enroute to Nikiski. The principal safety issue relates to vessels approached or moored during the winter at Nikiski facilities, where they are exposed to strong flood tide currents containing heavy ice. Loading delays up to six hours due to such conditions have occurred at the existing LNG dock. Non-continuous ice floes up to 0.8 kilometers (½ mi) in diameter and up to 1.2 meters (4 ft) accumulate on the east shore of Cook Inlet during flood tides. The resulting forces on ships are sufficient to break mooring lines. In such cases, damage can occur to drifting vessels, as well as other vessels in the area. The danger, thus, does not relate solely to traffic levels at a given facility but to the extent adjacent facilities are in use at the same time. Construction of the proposed Pacific-Alaska LNG dock facility could increase this hazard.

To reduce the likelihood of damage, the Nikiski Marine Terminal Safety Committee has established voluntary procedures which include the following:

Table III.C.6.c.-5
Ports of Kenai-Nikiski-Drift River - 1977 Tonnages (short tons), Barrels and Capacities

	(Short Tons)			Berth Occupancy			
				High(1, 2)		Low(1, 2)	
Handling Category	Inbound	Outbound	Throughput	Capacity	V/C(3)	Capacity	V/C(3)
Containerizable	---	---	---	---		---	
RO/RO	---	---	---	---		---	
Special	28,553	---	28,533				
Neobulk	765	---	765	1,744,200	.04%	1,324,800	.06%
Dry Bulk	---	---(4)	---(4)	720,000	---	345,600	---
Liquid Bulk	---	5,527,681	5,527,681	34,948,250	15.8%	19,775,000	28.0%
LNG	---	---	---	16,875,000	---	8,100,000	---
				(Bbls)		(Bbls)	
Anhydrous Ammonia	---	---	---	12,825,000	---	6,156,000	---
				(Bbls)		(Bbls)	
Bulk Cement	---	---	---	979,200		806,400	
Total	29,553	5,527,681	5,556,999				

Notes:
(1) Based on 318 available days in Kenai and 300 available days at Nikiski-Drift River.
(2) Port capacity is not a sum of capacities for each handling category. Each capacity assumes berths will be used only for that handling category.
(3) V/C = Volume (total throughput)/Capcity
(4) Chemical fertilizer output reported for Homer but originating in Nikiski is not included.

Source: Frederic R. Harris, 1978; Peter Eakland and Associates.

mooring with the bow facing flood tides, providing adequate mooring lines, providing necessary engine room and bridge watches, and maintaining the capability to immediately suspend cargo operations and to cast off mooring lines (Federal Power Commission, 1976).

In 1977, over 99 percent of the total throughput tonnage handled at Kenai, Nikiski, and Drift River Terminal consisted of petroleum products. Most were exports of crude oil from Nikiski and Drift River Terminal. Inbound, commodities handled were special items (32% of total inbound tonnage), chemical products (16%), lumber products (7%), stone and allied products (4%), and primary metal products (3%). All tonnage is considered to be neobulk or special (Harris, 1978). The remaining inbound commodity types amounted to one percent or less of the total inbound tonnage. Inbound shipments of liquid bulk are limited because the two local refineries supply most local needs. The Tesoro refinery, which receives the State of Alaska's royalty oil, recently has been unable to operate at design levels because of lower production in Cook Inlet fields. To fill the gap in supply, oil from the Trans-Alaska pipeline is now being shipped to the refinery. The high sulphur content of Prudhoe Bay crude oil limits the percentage that can be used from this source.

APPENDIX T

DESCRIPTION OF THE ENVIRONMENT
COASTAL ZONE MANAGEMENT

D. Coastal Zone Management

1. State Coastal Management Program: The Alaska Coastal Management Program (ACMP) was initiated in 1974, in response to the opportunity for coastal planning provided by the Federal Coastal Zone Management Act (CZMA) of 1972 (Alaska Office of Coastal Management and U.S. DOC, 1979). The Alaska Legislature adopted an Alaska Coastal Management Act (ACMA) in 1977, as enabling legislation for submittal and adoption of the ACMP (AS 46.40.010, et. seq.). The ACMA establishes an Alaska Coastal Policy Council for policy guidance in administration of the ACMP. The Act requires borough and first class cities to prepare district Coastal Management Programs (CMP). It also establishes procedures for the development of the CMP in the Unorganized Borough and designates State lead agency's responsibilities for administration of the ACMP.

The Alaska Coastal Policy Council has adopted guidelines and standards for the use of coastal resources. These guidelines and standards are the principle regulatory component of ACMP. The Coastal Policy Council uses these guidelines and standards for evaluating the acceptability of the district CMP and Coastal Resource Service Area Programs. In the absence of an approved district CMP for incorporated areas or a Coastal Resource Service Area Plan for an area in the unorganized borough, the State must refer to the Council's guidelines and standards along with other provisions of its approved ACMP to evaluate the suitability of proposed actions in the coastal zone.

The ACMP is not in itself a land and water use plan for geographically specific areas; the ACMP does not categorically allow and disallow specific types of actions in designated reaches of a coastal zone. Instead, the ACMP is a management process.

2. Energy Facilities Siting Process and Uses of State Concern: Of significance to this leasing proposal are provisions in the ACMP regarding the siting of energy facilities and the accommodation of land and water uses of State concern. The guidelines and standards of the Coastal Policy Council state in part that "sites suitable for the development of major onshore, nearshore, offshore, and outer continental shelf energy facilities must be identified by the State in conjunction with districts (6 AAC 80.070)." The approved State ACMP includes an "Energy Facilities Planning Process" as guidance for district coastal management programs in satisfying the above requirement (Alaska Office of Coastal Mgmt. and DOC, 1979).

The ACMA has separate requirements on uses of State concern of which energy facilities are an identified category (AS 46.40.210 (6); AS 46.40.060(a); AS 46.40.070 (c)). The ACMA requires a district CMP to, "not arbitrarily restrict or exclude uses of State concern (AS 46.40.060(a))." The Act sets forth three tests which must be met if a district program can reasonably restrict or exclude a use of State concern (AS 46.40.070(c)). These provisions in the ACMA, together with the Energy Facilities Planning Process of the ACMP, assure that siting of energy facilities in the coastal zone will be the subject of a rational planning process.

3. Kenai Peninsula Borough Coastal Management Program:

a. District Program Development: Most of the coastal area surrounding the proposed lease sale are a part of the Kenai Peninsula Borough.

As such, coastal zone management authority under the Federal CZMA and the Alaska ACMP will eventually be exercised by the Borough. The Borough presently does not have an approved district CMP.

The Borough has completed the first year of a three-year funding assistance program for development, approval, and implementation of a district CMP. The Borough's first year efforts have resulted in an environmental atlas and resources inventory of the Borough's coastal zone (Environmental Services, 1979), a phase 1 background report (Environmental Services, 1979), and a phase 1 draft coastal management plan (Environmental Services, 1980).

The Borough does not intend to adopt or distribute for view the consultant's draft coastal management program immediately. Instead, the Borough will use its second year of funding assistance to solicit community opinion on coastal management policies. The Borough plans to conduct meetings in ten communities of its coastal zone. The citizens will be asked to evaluate the consultant's district CMP recommendations in addition to offering their own. The Borough Planning Department will then formulate a district CMP based upon the input which it receives from the public meetings and hearings. The second year of district CMP development for the Borough is scheduled to run from April, 1980 to March, 1981.

The calendar dates for the third funding year of the Borough's CMP have yet to be established. The Borough would be eligible for implementation assistance of its CMP once its program is approved by the State legislature and it is incorporated into the State ACMP. The Borough's Planning Department presently intends to get a district CMP adopted by the Borough's Assembly in the fall of 1981. State review of the district program would occur in the fall of 1981 with legislative approval hoped for in January 1982.

b. Areas Meriting Special Attention: Kenai River Flats Proposal: Under provisions of ACMP, State agencies, or coastal resource districts may prepare an Area Meriting Special Attention proposal (AMSA)(AS 46.40.210(1); AS 46.40.040(1)(f); 6 AAC 80.160). The AMSA provisions in the ACMP provide for special consideration, in terms of planning and management, for discrete areas with specified characteristics. Once an AMSA is approved by the Coastal Policy Council or the District Coastal Management Plan is adopted by the legislature, then the specific management practices would be in effect.

The U.S. Fish and Wildlife Service (FWS, 1980) has proposed an AMSA for the Kenai River Flats area to the State Office of Coastal Management and the Kenai Peninsula Borough. The AMSA was proposed to protect wetland areas of the lower Kenai River drainage. These wetlands are significant for several reasons according to FWS (spring migration routes for snow geese, anadromous salmon spawning and nursery habitat, coastal flood plains and hydrologic recharge area, coastal geomorphic units which accommodate wave action, erosion, and storm damage, and an outdoor recreation and aesthetic appreciation area.

The FWS AMSA proposal would have the Kenai Peninsula Borough manage the Kenai River Flats area through the district CMP. The river flats would be divided into two land use categories--a "Conservation Zone" and a "Natural Areas Zone." The "Conservation Zone" would allow water dependent or water related land uses consistent with a district CMP for the Kenai Peninsula Borough. The

"Natural Area Zone" would emphasize activities which do not disturb or alter the natural environment. Development activity which disturbs or alters the wetlands habitat and water quality of an anadromous fish stream would not be allowed. The FWS additionally proposes that some lands be publically acquired in the Kenai River area in order to preclude disturbances.

The Alaska Department of Fish and Game has proposed an AMSA for a portion of the Kenai River Flats area. This portion concerns State owned lands only (ADF&G, 1979). The State ADF&G proposal is comparable in land use management concepts to the FWS proposal.

c. Areas Meriting Special Attention: Homer Spit Coastal Development Program: The Kenai Peninsula Borough (KPB) has applied for CZM grant assistance from the State Department of Community and Regional Affairs to develop a AMSA proposal for the Homer Spit (Kenai Peninsula Borough, 1980).

According to the borough, the Homer Spit is a natural site for port and harbor facilities which are needed to attract and support the expanding fishing industry and to meet marine transportation needs. The spit is also located in a State designated critical habitat area; Kachemak Bay is highly productive for commercial shellfish species.

The AMSA proposal would provide a management scheme to minimize conflicts between marine transportation, port activities, and maintenance of the pelagic and benthic communities of Kachemak Bay. The AMSA product is expected to be a Homer Spit Coastal Development Program which would regulate land and water uses of the spit. The program, when completed, would be incorporated into the KPB district CMP.

The Homer Spit Coastal Development Program will draw upon work of the KPB Ports and Harbors Study (Woodward/Clyde Consultants, 1980), as well as the city of Homer's Port Development Plan (TAMS Engineers, 1980), to identify land and water use needs of the spit. Refer to section III.C.7.b. of the EIS regarding land use for a discussion of the Port of Homer Development Plan.

d. Energy Facility Siting Analysis: Mention was made in section III.D.2. of the energy facility siting requirements in the ACMP. The KPB coastal management program will have to respond to the ACMP requirements. The borough has yet to adopt any official policies pursuant to these ACMP provisions. However, in the absence of official policies on energy facility siting, some guidance on possible policies as well as suitable sites in the borough's coastal zone can be obtained from studies sponsored by the borough.

Following OCS sale CI, the borough sponsored a study of the implications of OCS development for the Kenai Peninsula (CH2M-Hill, 1978). Although the analysis was directed to onshore impacts ensuing from OCS sale CI, the same types and locations of effects may be assumed for the proposed OCS sale 60, given the proximity of the lease tracts involved. The FEIS on OCS sale CI identified the following sites for a possible onshore facility locations (BLM, 1977):

Support Sites:	Nikiski, Homer, Seldovia, English Bay-Port Graham

Terminal Sites: Drift River, Nikiski, Cape Starichkof, and Cape Douglas

Treatment Facilities Sites: Tuxedni Bay, Cape Starichkof, Seldovia, English Bay-Port Graham

LNG Terminal Sites: Nikiski, Cape Starichkof

The KPB study analyzed all of these sites in terms of environmental impacts, infrastructure requirements, cost considerations, industry preferences, and concerns of local and State officials. The study findings on siting onshore OCS related facilities include the following:

Support Base Activity:

- During exploration and development phases of OCS activity: dock facilities at Nikiski, Homer, and Seldovia would be used to some extent.
- Sufficient staging and storage facilities exist in the Kenai and Nikiski area to support exploration and initial development activities.
- Some of the OCS support facilities would be moved to Homer in order to be closer to the lease area. Suitable industrial sites are available in the city of Homer, although acreage is presently not available on the Homer Spit and the City Dock.
- Construction of new suppport facilities at Cape Starichkof may occur in conjunction with an oil terminal or processing facility being sited there.

Oil Terminals and Treatment Facilities:

- Existing facilities at Drift River and Trading Bay might be expanded to treat and transport oil from the lower Cook Inlet.
- On the east side of the Inlet, only two sites appear to be feasible; Nikiski and Cape Starichkof.
- Any new oil terminal or treatment facility not located proximate to the Sterling Highway on the Kenai Peninsula would be dependent upon marine transportation. Hence, construction supplies and equipment would have to shipped from existing terminals and staging areas to such a new terminal.

Processing Facilities:

- Both construction and operations of processing facilities--LNG plants and oil refineries--require ready access to labor and supplies. They will, therefore, probably be located on the east side of the Cook Inlet--where highway, marine, and air transportation facilities are available.
- Nikiski is the most likely location for processing facilities, where at least a portion of the existing facilities could be used. The other potential site for processing facilities is the Cape Starichkof area.

- -- Construction of processing facilities in the Homer-Kachemak Bay area would probably cause considerable public opposition.

Aside from the above findings, the KPB study recommended the following in regard to onshore facility siting:

- -- Develop borough and city policies on locating new or expanded industrial facilities in Nikiski, Stariski-Cape Starichkof, Homer, and Seldovia. The policies should, in particular, consider limited dock and harbor resources, and conflicts between OCS, recreation, and fishing activities.

- -- Adopt zoning controls or facility siting permit procedures for large scale industrial projects.

- -- Review borough and city land leasing procedures to encourage stipulations on industrial uses.

The borough is currently sponsoring a Ports and Harbors Demand and Feasibility Study (Woodward/ Clyde Consultants, 1979). An objective of the overall project is to prepare a short range action plan and a long range master plan for ports and harbors development on the Kenai Peninsula. A key element in the project is the incorporation of OCS and energy demands into the borough's port and harbor planning. This project, when adopted by the borough, could be useful in its development of a district CMP; the analysis of future OCS development possibilities for purposes of port and harbor planning could be used to satisfy the energy facility siting requirements of the ACMP (personal communication, 1980).

An interim report of the project provides a schedule of possible improvement and new facilities to various port and harbor locations of the borough. OCS related improvements to these locations include the following:

- -- Construction support base for new Pacific-Alaska LNG facility to be located at Nikiski.

- -- Expansion to the existing Nikiski Rig Tenders dock with development of a new small, protected harbor north of the existing rig tenders dock. These improvements would partially serve offshore oil and gas operations in both the State and OCS (Federal) waters.

- -- Construction of a new deep water port at Cape Starichkof, if a commercial find of hydrocarbons is made from either OCS sale CI or proposed sale 60. At least one mile of ocean frontage, extending landward to the Sterling Highway, should be zoned and reserved for oil related industrial development.

- -- Expansion to the port of Homer to include a 30-acre industrial staging and storage yard to the north of the existing boat harbor. One of the functions served by this facility will be to provide a staging area for OCS support goods movement and storage.

- -- Suggested improvements to other Kenai Peninsula ports do not include any facilities for OCS support purposes.

The schedule of harbor and port improvement does not imply a recommended program for KPB port and harbor development. The interim study instead considered three different combinations of improvements and changes to the various port and harbor facilities. These combinations reflect different levels of investment and policy assumptions on the borough and incorporated communities towards ports and harbors development. Only when the Ports and Harbors Master Plan is completed and adopted will the borough's policy on port improvements for oil and gas operations be officially expressed.

4. Kodiak Island Borough Coastal Management Program:

a. Program Development: The Kodiak Island Borough (KIB) has recently commenced a district CMP through receipt of grant assistance from the State Department of Community and Regional Affairs. The first phase of the borough's CMP will result in a plan to be conceptually approved by the Borough Assembly in the spring of 1981. Under its proposed schedule of coastal program development, the KIB would submit its district CMP to the State for review and approval in the fall of 1981, and for approval by the legislature in January of 1982.

b. Energy Facility Siting Analysis: Analysis of energy facility siting policies of the KIB-CMP is similar to that of the KPB. In the absence of offical CMP policies on energy facility siting, some guidance on possible policies, as well as suitable sites in the borough's coastal zone, can be obtained from studies sponsored by the borough.

The major difficulty with formulating hypothetical KIB energy facility siting policies, for purposes of comparison with the proposal's development scenario, is that the KIB sponsored studies are all predicated on a Western Gulf of Alaska lease sale rather than a Shelikof Strait lease sale. The KIB studies are useful to the extent that policy recommendations on OCS related industrial siting procedures can be identified.

In 1977, the borough sponsored an OCS impact study which was subsequently approved by the Borough Assembly as a "planning document" (Simpson, Usher, Jones, 1977; Personal Communication, 1980). This study produced findings and recommendations. Subsequent to this study, the KIB sponsored a regional plan and development strategy (Kramer, Chin, and Mayo, 1978), which incorporated the analysis from the earlier OCS impact study. This subsequent report has not been officially adopted by the Borough Assembly. However, the "Community Goals and Objectives" portion of the study has been officially adopted as borough policy. The goals and objectives pertinent to OCS facility siting on KIB lands are reproduced below:

Land Use Goal: To work towards eliminating existing conflicts in the land use patterns within the KIB, and to plan for low intensity development that preserves the land use integrity of residential areas, and concentrates commercial and industrial developments and strategic locations.

> Objective: Develop a capability for stronger, more effective zoning enforcement.
>
> Objective: Assure, in establishing zoning patterns, that land use category separations are located along natural and man-made boundaries that

effectively buffer potentially conflicting land use districts from each other.

OCS Development Goal: To discourage the development of OCS related facilities in or around the population centers on Kodiak Island, and if OCS facilities are located anywhere on the Island, to require that they be concentrated in a limited number of locations as well as be self-sustained at their remote sites.

Objective: To prepare land use regulations that can effectively control the location of OCS related facilities including indirect and ancillary uses.

Objective: To prepare and adopt detailed OCS facility location policies and a fiscal planning process.

Objective: To encourage the oil industry to participate in funding efforts to mitigate the adverse impacts of their activites in the Kodiak Shelf.

Objective: To establish borough-wide environmental impact review and control procedures applicable to OCS related facilities in order to assure that the natural environment is preserved and enhanced throughout any future period of OCS development.

Objective: To investigate the feasibility of local government development and ownership of onshore OCS related facilities to be leased to the oil industry (Kramer, Chin, and Mayo, 1978).

The borough sponsored regional plan also analyzed OCS related industry activity. Findings and recommendations from this section of the regional plan include:

-- Enough feasible, environmentally acceptable, sites appear to be available that the borough can greatly influence the choice of a site. This finding derives from an oil terminal siting study done in anticipation of a Western Gulf of Alaska lease sale only (Woodward/ Clyde Consultants, 1977).

-- OCS related onshore development should be kept out of the urban area and villages. If possible, one of the Native corporations should receive some of the benefits associated with the provisions of onshore facilities. However, the door should be left open for possible joint development of a service base near the Kodiak urban area in view of the problems posed by the Pillar Mountain landslide and its proximity to the inner harbor.

-- The recommended strategy for dealing with OCS facilities revolves around two major points; 1) the borough, in cooperation with other local jurisdictions and groups, such as Koniag, can and should designate the feasible sites; and 2) the zoning ordinance should be amended to encourage development only on these sites, and in any case, under carefully designed conditional use procedures. The regional plan goes on to detail suggested revisions to the borough's zoning ordinance in order to accomplish these purposes.

A third study sponsored by the KIB examined candidate oil terminals sites on the Kodiak Archipelago in context of a Western Gulf of Alaska lease sale (Woodward/Clyde Consultants, 1977). This is the only facility siting study actually sponsored by the borough. This study was adopted as a planning document by the Borough Assembly (personal communications, 1980). However, the study findings do not constitute an official land use or energy facility siting plan for the KIB. The array of candidate oil terminal and OCS service base sites studied are shown schematically in figure III.A.-1. The siting study ranked the candidate sites based on various criteria.

Significant policy assumptions were entailed in the oil terminal and OCS support base site evaluation. These policies assumptions include the following:

-- Avoidance of existing community and harbor facilities. Terminal locations sited near such areas were presumed to adversely affect them and were scored negatively.

-- Avoidance of overland pipeline routes or minimum overland pipeline distance. Terminal locations using overland pipeline corridors were presumed to adversely affect terrestrial biological features and habitat; these were scored negatively.

-- Minimizing pipeline distance, either onshore or offshore. Terminal locations which were closest to the hypothesized producing fields (Western Gulf of Alaska) were presumed to beneficially effect the economic cost of petroleum development infrastructure. Such locations were scored positively.

-- Avoidance of critical marine habitat and pelagic/benthic communities for the bay(s) in which the marine terminal and pipeline landfall would be located. Marine species and habitat (through specific indicators) were presumed to be sensitive to and adversely affected by OCS marine terminal facilities siting. Site locations with these adverse impacts were scored negatively.

The KIB recognizes that its 1977 study on facility siting done for a proposed Western Gulf of Alaska lease sale must be updated to include the Shelikof Strait and Chiniak Bay areas. The borough has submitted applications for funding assistance under the Coastal Energy Impact Program for new facility siting studies in the Shelikof Strait and Chiniak Bay areas (Kodiak Island Borough, 1980).

APPENDIX U

DESCRIPTION OF THE ENVIRONMENT
WATER QUALITY

E. Water Quality

1. Marine Water Quality Criteria: The management objectives for water quality of the U.S. oceans are set forth in the Clean Water Act as amended (33 USC 1251, et. seq.). The U.S. EPA has promulgated water quality criteria by type of receiving water, beneficial use, and water quality constituent pursuant to this act (33 USC 1312). The water quality criteria used in this section draw upon those promulgated by the EPA (EPA, 1976), as well as recommendations of the U.S. National Academy of Sciences (NAS, 1972).

Under the Clean Water Act amendments of 1977, EPA was given authority to promulgate ocean discharge criteria based upon water quality considerations for marine receiving waters (33 USC 1343(c)). EPA published proposed rules for ocean discharge criteria; however, these are under review and have yet to be officially promulgated (40 CFR 125, Subpart M (new); 45 FR 9548). Under the proposed rules, EPA would not specify numerical marine receiving water limitations for various pollutants. Instead, the EPA rules would require permit applicants to show that the concentration and type of contaminants in discharges would not adversely affect the marine environment.

The discussion of marine water quality in the proposed lease area involves a comparison of reported baseline concentrations against established or putative Federal water quality criteria and the State of Alaska water quality standards. Both Federal and State water quality management does not require evaluation of marine sediment quality or bioaccumulation of marine biota as indicators of marine water quality. Clearly, pollutant species move between these receptor types in the water column. Other sections of this DEIS acknowledge this interaction and its significance on marine and terrestrial biota. Sections IV.A.2.a. through g. consider bioaccumulation of contaminants in marine and terrestrial biota.

2. Trace Metal Concentrations: The following elements are considered to be the most toxic of the trace metals: chromium, copper, nickel, cadmium, mercury, lead, and barium (Clark, 1978; Ketchum, 1973). However, there is disagreement on the exact order or relative importance of toxic metals because of presently limited understanding of marine pollutant concentrations and processes (Burrell, 1977). The above cited elements are either naturally occurring in crude oil or formation waters or are present in drilling fluid discharges in concentrations greater than the established marine water quality criteria.

Table III.A.2.c.-1 summarizes the water quality data for selected trace metals in comparison with established Federal receiving water quality criteria. The baseline concentrations of the trace metals constituents were sampled along transects in the lower Cook Inlet and the Shelikof Strait waters extending out to the Kodiak shelf. Refer to figure III.A.2.c.-1. Data in the table show that the highest reported concentrations for cadmium, lead, copper, selenium, and chromium are below the applicable Federal water quality criteria. Some of the reported concentrations of zinc were close to the Federal criterion of one part per billion (ppb).

Concentrations of vanadium are included in the table, even though this is not considered to be a toxic substance by U.S. EPA pursuant to section 307(a)(1) of the Clean Water Act as amended. Additionally, EPA has not promulgated a water quality criterion for this trace metal. However, vanadium is naturally found in petroleum and, hence, is of interest as a possible indicator constituent in water column chemistry and monitoring of marine water quality. OCSEAP sampling of trace metals did not include barium or nickel in the transects shown in figure III.A.2.c.-1. The background concentration of these elements in seawater is on the order of micrograms per liter (ug/l) or parts per billion (Clark, 1978; Bowen, 1966).

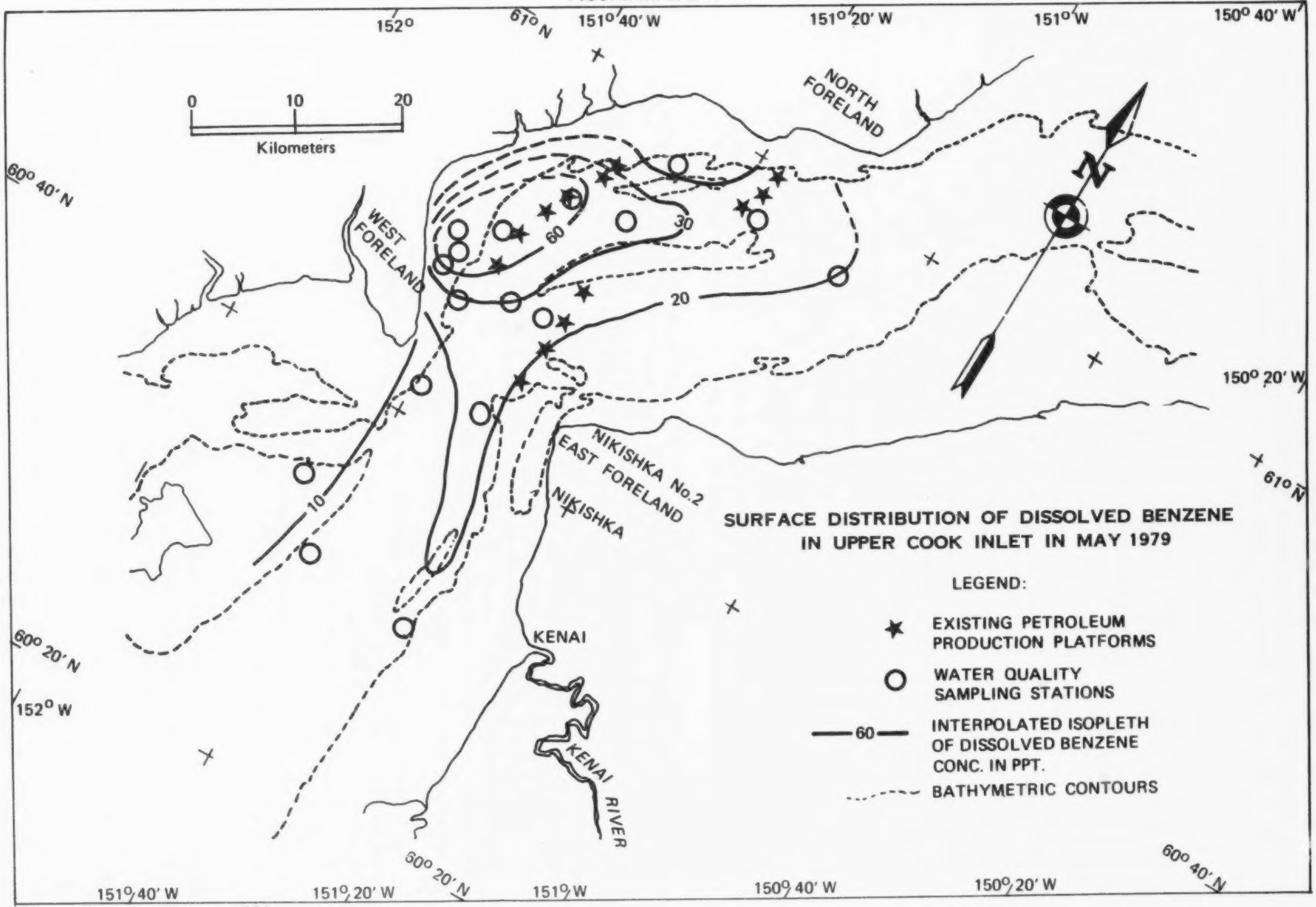
3. Hydrocarbon Concentrations: Evaluation of the existing marine water quality for hydrocarbon constituents is complicated by the several types of hydrocarbons present, their relative toxicity to pelagic communities, and the difficulties in separating out toxic hydrocarbon groups through analytical tests (National Academy of Sciences, 1973; Malins, 1977; Trasky, 1977; and Alaska DEC, 1979). The State of Alaska has commented on this issue in its rationale for a hydrocarbon limitation in territorial receiving waters:

> "The U.S. Environmental Protection Agency recommends using a safety factor of 0.01 of the lowest LD50 of the most sensitive fresh water or marine species of life stages tested in establishing allowable hydrocarbon levels in the aquatic environment (EPA, 1976). Given an average lethal value of 1.0 ppm for sensitive Alaskan organisms, a standard of 0.01 ppm (10 ug/l) was established by ADEC for total aromatic hydrcarbons... [T]otal hydrocarbon (TH) concentrations in the water soluble phase are generally proportional to total aromatic hydrocarbons (TAH) concentrations in the same test solution (Anderson, 1977; Rice, Short, and Karinen in Wolfe, 1977). This toxicity ratio (TH:TAH) is roughly 1.5:1 for crude oil using various fish species as test organisms. Applying this average ratio, an allowable level of 15 ppb (ug/l) total hydrocarbons (using infrared analysis) was adopted for the aquatic environment [by AEDC].
>
> The rationale for setting both a TH and TAH standard is partially based on available comparable data: The laboratory data base for acute and sublethal levels is primarily reported at TH (using infrared analysis), while TAH has recently been recognized as more closely characterizing the toxic water soluable fraction of petroleum hydrocarbon solutions. As the field and laboratory data base for TAH expands, it anticipated that the TH standard will be revised or possibly dropped (ADEC, 1979)."

Table III.E.3.-1 summarizes observations of dissolved hydrocarbon concentrations in Cook Inlet waters. The table reports the hydrocarbon material analyzed in two groups, referred to as "Fraction 1" and "Fraction 2". The first fraction consists of saturated and olefinic hydrocarbons. The second fraction contains larger and more extensively unsaturated hydrocarbons, aromatic hydrocarbons (if present), and some non-hydrocarbon organic compounds. These two fractions could be added to estimate total hydrocarbon concentrations. However, the additive concentrations of Fractions 1 and 2, as measured, could significantly underestimate the dissolved TH concentration which has been established as a State water quality standard.

The data in table III.E.3.-1 show that the individual hydrocarbon fractions were all below 1 ppb, with the exception of one observation. If the reported Fraction 1 and Fraction 2 concentrations are added at each of the sampling

FIGURE III. E. 3.–1



SURFACE DISTRIBUTION OF DISSOLVED BENZENE IN UPPER COOK INLET IN MAY 1979

152°
61° N
151° 40′ W
151° 20′ W
151° W
150° 40′ W
0
10
20
Kilometers
60° 40′ N
NORTH FORELAND
WEST FORELAND
60
30
20
10
150° 20′ W
61° N
NIKISHKA No.2
EAST FORELAND
NIKISHKA
KENAI
KENAI RIVER
60° 20′ N
152° W
LEGEND:
EXISTING PETROLEUM PRODUCTION PLATFORMS
WATER QUALITY SAMPLING STATIONS
INTERPOLATED ISOPLETH OF DISSOLVED BENZENE CONC. IN PPT.
BATHYMETRIC CONTOURS
151° 40′ W
151° 20′ W
60° 20′ N
151° W
150° 40′ W
150° 20′ W
60° 40′ N

Source: Cline, Bates & Katz, 1980

Table III.E.3.-1
Hydrocarbon Concentrations in Water From Cook Inlet, Alaska, 1976

Station Position		ug/Kg (ppb)	ug/Kg (ppb)
Latitude	Longitude	Fraction 1	Fraction 2
59°03.1'N	151°52.4'W	0.17*	0.05
59°03.25'N	152°41.2'W	0.71*	0.41
59°03.1'N	153°23.4'W	0.46*	0.21
59°17.7.'N	152°07.7'W	0.14*	0.04
59°17.2'N	152°41.1.'W	0.02*	0.29
59°17.2'N	153°14.1'W	0.12* NB	0.10 NB
59°42.7'N	151°07.4'W	0.33*	0.04
59°34.2'N	151°25.4'W	0.50*	0.61
59°33.2'N	151°36.4'W	0.25*	L
59°35.4'N	151°49.7'W	0.52*	0.20
59°35.3'N	152°09.8'W	0.30*	0.39
59°35.25'N	152°29.8'W	0.38*	0.26
59°35.25'N	152.49.8'W	L	L
59°35.2'N	153°16.7'W	1.02*	0.44
59°46.2'N	152°08.7'W	0.76*	ND
59°46.3'N	152°45.3'W	0.41*	0.13
60°01.2'N	151°53.2'W	0.11*	0.91
60°01.2'N	152°01.9'W	0.15* NB	0.16 NB
60°01.3'N	152°21.1'W	0.20*	0.15
60°01.2'N	151°31.4'W	L	L

L = Lost during sample prepartion
ug/Kg = ug of sample detected per Kg surface water extracted
NB = Niskin bottle extraction was performed
* = Adjusted from 61.52% recovery of PHR spike addes, standard deviation 18.24
ND = None detectable

Source: Shaw, D., 1977.

stations, the resulting concentration would still be at least an order of magnitude (10^1) less than the State standard for TH. However, hydrocarbon groups not measured in the Fractions 1 and 2 sampling could raise the true concentrations of dissolved TH at these sampling stations closer to the State water quality standard.

The dissolved aromatic fraction of hydrocarbons is considered to be more significant for purposes of water quality management (Alaska DEC, 1979; Shaw, 1977). Although the "Fraction 2" measurement of hydrocarbons could incorporate dissolved aromatic hydrocarbons, this measurement is not precise with the technique used (Shaw, 1977). Better methods for measuring toxic aromatic hydrocarbons involve gas chromatographs of individual toxic compounds. Investigators have recognized that two aromatic hydrocarbon compounds are expected to play a significant role in overall toxicity--benzene and toluene (National Academy of Sciences, 1973; Caldwell, Caldarone, and Mallon in Wolfe, 1977).

Table III.A.2.c.-4 summarizes observations on specific aromatic hydrocarbon compounds for sampling stations in Cook Inlet waters. The data in table III.A.2.c.-4 show that the values for benzene, toluene, and C_2 benzenes were in the range of low nanograms/liter (ng/l) or parts per trillion (ppt). Figure III.E.3.-1 shows the location of the sampling stations and the interpolated dissolved benzene concentration intervals in upper Cook Inlet waters. This sampling of aromatic hydrocarbons is significant for purposes of assessing the level of some toxic hydrocarbon contaminants in Cook Inlet waters because the sampling grid was located in the vicinity of existing petroleum production platforms. Figure III.E.3.-1 superimposes the location of existing production platforms in Trading Bay and between the western East Forelands.

No State water quality standards or Federal water quality criteria have been established for benzene or toluene hydrocarbon compounds. However, available toxicity studies of these two compounds show LD50 responses of test species to be in the low ppm (National Academy of Sciences, 1973; Caldwell, Caldarone, and Mallon, 1977). Assuming an LD50 effect at 1 ppm, and a water quality standard of 0.01 of this value (or 1 ppb), the reported range of benzene values in table III.A.2.e.-4 is at least two orders of magnitude (10^2) less than this hypothetical standard/criterion for benzene. The same finding on marine water quality of toluene as a dissolved aromatic hydrocarbon in Cook Inlet can be made assuming a LD50 value for test species in the low ppm range (National Academy of Sciences, 1973).

4. Synthetic Organic Chemical Concentrations: No baseline data are available for Cook Inlet waters for various synthetic, organic chemicals which are toxic to pelagic communities and/or man. Included in this group of compounds are pesticides, herbicides, chemical additives for industrial processes, etc. The EPA has announced a list of 65 toxic substances, most of which are synthetic/organic compounds for which separate affluent limitations or prohibitions will be prepared under the Clean Water Act, as amended (EPA, 1978; 33 USC 1317(a)(1); 44 FR 4108).

Existing concentrations of synthetic, organic constituents in the water column of Cook Inlet are presumed to be low because of the absence of major point and non-point sources. According to NAS, the toxic thresholds for mammals and aquatic organisms are in the order of parts per million in concentration, or 10^6 or more times the known level in the marine environment (National Academy of Sciences, 1973).

5. Existing Wastewater Discharges in Cook Inlet: Major sources of wastewater discharges exist in the Cook Inlet: municipal waste, discharges of petroleum production platforms operating in territorial waters of upper Cook Inlet, discharges from commercial fishing vessels, ocean-going vessels, and hydrocarbon carriers. The stationary sources of discharge are regulated by the EPA under the National Pollution Discharge Elimination System (NPDES) pursuant to the Clean Water Act requirements. EPA stipulates numerical limitations on discharge constituents, flow rates, and discharge locations in order to minimize adverse effects upon beneficial uses of receiving waters. Discharges of sanitary wastes from commercial vessels and petroleum ballast waters from tankers is regulated by the U.S. Coast Guard. Refer to section IV.A.2.o. regarding the impacts of the proposal on marine water quality for discussion of the magnitude of wastewater releases, the regulated contaminants involved, and compliance with State and Federal water quality management programs.

APPENDIX V

DESCRIPTION OF THE ENVIRONMENT
AIR QUALITY

F. Air Quality

1. Air Quality Management Programs: Pursuant to requirements of the Clean Air Act as amended, the State of Alaska has prepared a State Air Quality Control Plan (Alaska Department of Environmental Conservation, 1980). This plan divides the State into Intrastate Air Quality Control Regions (AQCR), reports on air emissions and air monitoring trends, projects future conditions, and includes control strategies for attainment and maintenance of State and Federal ambient standards.

The proposal is situated within the Cook Inlet Intrastate AQCR, as well as the Southcentral Alaska AQCR. State ambient air quality standards are summarized in table III.F.1.-1. The Federal ambient standards are not shown because the State standards are more stringent and air monitoring analysis shows compliance with State's standards for the most part.

Under provisions of the Federal Clean Air Act as amended, AQCRs within the State must be classified as to ambient air quality for those regions with ambient air quality superior to that required by the primary National Ambient Air Quality Standards (NAAQS): Class III areas are those in which the NAAQS are exceeded; these are "non-attainment" areas. Classes I and II areas are those in which ambient air quality is superior to the NAAQS, and in which maximum allowable increments above baseline concentrations are established. Class I areas include certain national parks, national wilderness areas, and national wildlife refuges which meet specified criteria (PL 95-95, Sections 160-164).

2. Air Monitoring Analysis and Compliance with State Standards: Ambient air quality in the Cook Inlet AQCR was reported by the U.S. EPA to be in compliance with all NAAQS with the exception of TSP (U.S. EPA, 1978) and carbon monoxide (CO) in the Anchorage area only. However, this finding was not predicated upon a review of monitoring data. Instead, EPA interpreted that area emissions inventory with known meteorological conditions.

Monitoring data on TSP for three Kenai Peninsula locations is summarized in table III.F.2.-1. This is the only published air monitoring data available for coastal regions in the vicinity of the proposed sale area. Additionally, air monitoring was done for a brief period in the coastal area between Kenai and Nikiski as part of the Pacific-Alaska LNG Facility site selection analysis (Dames and Moore, 1978). Ambient air quality observations for SO_2, TSP, CO, and nitrogen dioxide (NOX) at this site are displayed in table III.F.3.-1.

The TSP annual geometric mean values monitored at Kenai and Nikiski for the years 1975-1978 were in the range of background values for TSP (30-40 ug/m^3) suggested by U.S. EPA (EPA,1978). The TSP annual mean values monitored at Homer were slightly higher (60-70 ug/m^3) and violated the State standard for TSP. Table III.F.2.-1 also shows that the State TSP standard for 24-hour exposure was exceeded eleven times in 1978 at the Kenai and Homer monitoring stations while only once at the Nikiski LNG plant location.

An inspection of tables III.F.1.-1 and III.F.2.-1 shows that the air monitoring done at the coastal site north of Kenai yields low values in comparison to the State air quality standards: the mean values for SO_2, NOX, TSP, and CO were all fractions of the State standards. However, it should be recognized that these observations reflect air monitoring done only from September to December.

Table III.F.1.-1
State of Alaska Ambient Air Quality Standards
Measured in ug/m^3

	Averaging Time				
Criteria Pollutant	Annual[c]	24-hr	8 hr	3 hr	1 hr
Total Suspended Particulates	60[a]	150	--	--	--
Class II[f]	19[a]	37	--	--	--
Class I[f]	5[a]	10	--	--	--
Carbon Monoxide	--	--	10,000	--	40,000
Ozone	--	--	--	--	235
Nitrogen Dioxide	100	--	--	--	--
Lead	1.5	--	--	--	--
Sulfur Oxide	80	365	--	1300	--
Class II[f]	20	91	--	512	--
Class I[f]	2	5	--	25	--

Source: 78 AAC 50.020; Alaska Dept. of Environmental Conservation. 1980; 40 CFR 52.21 (43 FR 26388).

a = Annual geometric mean.
- = No standard for exposure interval indicated.
b = Measured as sulfur dioxide.
c = Annual arithmetic mean.
d = The State's ozone standard compares with U.S. EPA standards for photochemical oxidant(s) which are measured as ozone.
e = Quarterly arithmetic mean instead of annual.
f = The standards for Class I and Class II areas refer to the EPA Prevention of Significant Deterioration Program. The standards express maximum allowable increments in air quality attributable to proposed emission sources above baseline (existing) air quality conditions.

Table III.F.2.-1
Summary of Kenai Peninsula Air Monitoring for Total Suspended Particulates[a]

Monitoring Locations	Annual Geometric Mean	Exposure Interval No. of 24 Hour Observations Exceeding 150 ug/m^{3}[b]	 260 ug/m^{3}[c]
Homer Fire Department			
1975	190	14	12
1976	61	5	2
1977	68	5	1
1978	69	11	3
Nikiski Phillips LNG Plant			
1975	36	1	1
1976	41	3	1
1977	23	1	0
1978	19	1	0
Kenai Fire Stations			
1975	48	2	1
1976	35	1	1
1977	34	2	0
1978	33	11	0

[a] All observations are measure in micrograms per cubic meters (ug/m^{3}).

[b] State ambient standard.

[c] Federal primary ambient standard.

Source: Alaska Department of Environmental Conservation, 1980.

3. PSD Area Designations: Under the Prevention of Significant Deterioration program (PSD) of the Federal Clean Air Act, a Class I area has been designated on the west side of Cook Inlet. The Tuxedni National Wildlife Refuge on Chisik Island was considered by U.S. EPA to be suitable for a PSD Class I area designation. It should be noted that the proposed additions to the Tuxedni NWR along the western coast of Cook Inlet are presently not a part of the U.S. EPA designated Class I PSD area. Refer to section III.C.5. No air quality monitoring exists in the uninhabitated reaches of the western shorelines of Cook Inlet to establish baseline ambient air quality conditions near the Tuxedni NWR.

Other Federally managed lands near the proposed sale area may be suitable for PSD Class I designation. Until Alaskan national interest lands legislation is enacted, and the discrete management status and boundary units are known, air quality PSD Class I designations would be speculative for purposes of environmental assessment in this impact statement.

Table III.F.3.-1
Summary of Nikiski Air Quality Monitoring Program

		Concentrations (ug/m^3)[a]		
Pollutant	Monitoring Period	1-hour Maximum	24-hour Maximum	Average
Sulfur Dioxide	10/05/78 to 12/15/78	26	--	0
Particulates	09/05/78 to 03/28/79[b]	--	253	10[c]
Nitrogen Dioxide	10/05/78 to 12/15/78	60	--	20
Carbon Monoxide	09/23/78 to 12/15/78	6850	--	1000

a. Based on measurements made in parts per million and rounded to the nearest whole number.
b. A total of 65 24-hour samples were taken at two separate locations.
c. Geometric Mean based on 65 samples.

Source: Dames and Moore, 1979.

APPENDIX W

DESCRIPTION OF THE ENVIRONMENT FUTURE ENVIRONMENT WITHOUT THE PROPOSAL

H. Future Environment Without the Proposal

1. Social Factors: The following discussion is a forecast through the year 2000 of anticipated growth in Kenai, Soldotna, Homer, Kodiak, and Port Lions without the proposed lease sale. Sources of information for this discussion include: Alaska Consultants, Inc., 1980, Technical Report Number 46, Volume 2; Alaska Consultants, Inc., 1979, Technical Report Number 40; Kodiak Native Association, 1980, Overall Economic Development Program 1980; Kodiak Area Native Association, 1979, Five Year Regional Health Plan 1981-1985.

Kenai: Under the base case, growth impacts at Kenai are expected to stem from consolidation of its position in the economic functions that now support the community. Continuing economic growth is forecast, but with no noteworthy sudden departures from recent economic trends. The Kenai area will maintain its oil and gas and petrochemical base, drawing upon existing and yet-to-be proven hydrocarbon reserves anticipated from new State leases and sale CI. An additional LNG plant will be constructed, beginning in 1981. Expanded commercial fisheries and fish processing and tourism industries are expected to support some growth.

The pace of population growth, estimated to average just over 2 percent annually, is even slower than during the post-1970 period and is quite different from the explosive growth pattern of the 1960-70 decade. In sum, the base case projection envisions a diminished rate of economic and population growth for the City of Kenai. The population is forecast to rise from an estimated 4,755 in 1980 to 7,000 in 2000.

The projected base case growth is not expected to generate any exceptional growth-related burdens on Kenai's municipal facilities and services. The relatively easy pace of town growth since 1970 has enabled Kenai to catch up with the backlog of municipal needs that accumulated during the hectic expansion of the 1960's. Now, Kenai is generally better positioned to absorb without disruption such growth impacts as may occur in conjuction with another LNG plant project, sale CI, and other anticipated developments. On the whole, the forecast gradual growth is expected to generate demand for such routine improvements as expanded water supply, minor improvements and corrections to the sanitary waste system, a new landfill site, and additional fire station and recreational facilities.

Soldotna: Soldotna is estimated to grow at an annual average rate of about 4 percent under the base case forecast. This growth rate is slower than in the previous decade and much slower than the decade before that. Soldotna's growth is linked to its role as a residential community and commercial and service center for the Central Peninsula area upon whose overall economic vitality its own prosperity depends. It is not anticipated that any major new industrial employers will locate within Soldotna, although the city is expected to capture a part of the region's resident offshore work force for sale CI.

As Soldotna's population is estimated to increase by about 81 percent over the forecast period, the city should experience a trend toward a more urbanized community. The population of Soldotna is forecast to grow from an estimated 2,572 in 1980 to 4,667 in 2000. The major growth impact issues at Soldotna will likely be related to relatively routine matters such as the town's water supply problem, the already scheduled waste treatment plant improvements, development of a new sanitary landfill site, and construction of additional fire stations to service new development. In comparision to Soldotna's recent history, the forecast imposes only moderate physical growth management demands upon the city.

Homer: The economic base analysis indicates that the city of Homer's growth will be stimulated by a continuing dynamic economy during the forecast period. Strong growth in a number of different sectors is expected to contribute. Development of a groundfish industry in lower Cook Inlet waters will likely be based at Homer's port, which will also benefit from improved economic conditions in the traditional fisheries. Homer is also advantageously located to serve as the home community for some of the permanent offshore work force operating the fields developed in sale CI lease areas. Finally, Homer's continuing appeal as a tourism and recreation center can support further expansion in the trade and services sectors of its economy.

The net result of these factors is that Homer is projected to average growth at about 7.5 percent annually, for a cumulative increase of 153 percent over the forecast period. Homer's population is forecast to increase from an estimated 2,148 in 1980 to 5,429 in 2000. For a community of Homer's size, this is a high rate of sustained growth.

Homer's projected rapid growth, especially in comparison to its present size, can be expected to place some heavy demands upon the city for maintenance of community infrastructure and services. Particular issues of potential concern are residential land development, including the extension of utility services; additional water treatment capacity (the basic water supply appears adequate for the base forecast); major expansion of the sanitary waste treatment facility; development of a new sanitary landfill site; and expanded police and fire protection services, including additional jail facilities and fire stations. Also, growth in the fishing fleet and local fish processing industry is likely to necessitate further port development.

Kodiak: The base case forecast is for steady population growth in the Kodiak urban area at an average rate of over 5 percent annually and a cumulative increase of over 120 percent over the forecast period. The key economic activities in Kodiak's future will remain the fishing and seafood processing industries. Kodiak is well situated to expand into the bottomfishing industry as that new resource for Alaska's fishing fleet and processing industry begins to realize its potential. Also, the trend toward a more diversified year-round fishery is expected to continue.

Due to the existing locational pattern of harbor and processing plant facilities, the city of Kodiak is forecast to strengthen its preeminent role as the center of the island's fishing industry. Thus, about two-thirds of the Kodiak area's population growth and most of the employment growth is expected to take place within the city. Kodiak is forecast to grow from an estimated 4,818 in 1980 to 10,229 in 2000.

Overall, the Kodiak urban area is estimated to more than double in population during the forecast period and, thus, about double in its general requirements for community infrastructure. According to the economic forecast, the growth trend will be steadily upward, without big population swings which would complicate community planning and development programs. On the other hand, there are a couple of elements in the community infrastructure which have historically been in short supply or may be costly to expand much beyond present capacities.

Despite recent residential construction activity, the Kodiak urban area continues to experience a general housing shortage. Housing accommodations are particularly short for seasonal and transient workers. This situation, unless alleviated, may inhibit the projected expansion of the seafood processing industry and detract from Kodiak's economic base growth.

Also critically related to Kodiak's economic growth are the cost and reliability of two basic utilities--water and power supply. At times, industrial water use, mainly for seafood processing, accounts for up to 95 percent of the city of Kodiak's water consumption. As the city water supply is even now sometimes overtaxed at periods of peak plant operation, it is clear that a major water development project is a prerequisite for Kodiak to achieve its full economic potential as a base for seafood processing.

Electric power costs are high in Kodiak for industrial and residential consumers alike. Power requirements are forecast to nearly triple. If the Kodiak Electric Association (KEA) is unable to develop a lower cost alternative to its existing diesel generated supply, then the price of power may prove to be another brake on Kodiak's economic gowth potential.

Finally, the Kodiak area can expect to face a steady stream of the public works projects routinely required to service its growing urban residential area, such as the construction of new school facilities and the extension of water and sewer systems to escape the pollution potential of poor subsoils and drainage.

In quantitive terms, the base case growth forecast projects that Kodiak's population will increase by an estimated 112 percent by 2000. The physical impact of this growth upon Kodiak's community infrastructure will clearly be substantial and will tend toward a more urban physical development pattern and lifestyle than is currently the case. The basic orientation of the town's economic base toward the fishing and fish processin industry is expected to persist. However, with the successful entry into large scale bottomfishing, the local fishing and fish processing industry should be characterized by high year-round levels of activity, essentially eliminating the seasonality normally associated with this industry.

Because the employment and population projections anticipate more rapid growth in the first half of the forecast period, the demand for additonal housing, community facilities and utilities, plus attendant pressures on local financial resources, should be felt most strongly during the next ten years. Although the city of Kodiak's fiscal position is now stronger than that of most Alaska municipalities, if it commits itself to major new public works projects to accommodate growth, the added debt service demands could compel it to tap new revenue sources.

Port Lions: Port Lions is estimated to grow at an annual rate of 3 percent under the base case forecast. This growth rate is slightly higher than other Kodiak Island villages and stems primarily from the community's expressed desire to attract new industry and the expanded housing availability which

best copy available

will encourage a larger proportion of the younger populace to remain in the community, rather than emigrate as has been the case in the past. The population of Port Lions is forecast to grow from an estimated 266 in 1980 to 481 in 2000. Even this moderate 3 percent annual growth rate is substantial on a community the size of Port Lions.

The most significant problem which the community faces during this period is a continuing housing shortage. While the 35 new housing units will provide substantial relief in the near future, this supply is not expected to sustain growth and by the early 1990's, the community will experience the same housing shortage it now has. Unless a means for increasing the housing supply is found, the shortage will become severe by the end of the forecast period.

Concurrent with the need to expand housing supply will be the need to expand other services such as water, sewer, electrical power, and police and fire protection. Without an expanded tax base, this could prove problematic for the community; however, the community has proven itself quite capable of attracting financial resources to meet its needs and this pattern can be expected to continue.

2. Economy:

a. State and Regional Economies: The future of the Alaskan State and regional economies in the no sale case is described in the following publications: University of Alaska, Institute of Social and Economic Research (1980), Technical Memoranda 1 and 2 and Technical Report Number 42; U.S. Department of the Interior (1979), The Western Gulf of Alaska DEIS, OCS Lease Sale 46, and (1976) The Lower Cook Inlet EIS, OCS Sale CI. The State and regional impacts of the proposal are relatively minor, and the reader is referred to the above document for the State and regional "no sale" situation.

b. Local Economies:

Kodiak

The local Kodiak no sale case is described below and is derived from Alaska Consultants, Inc., Technical Report Number 40, 1979.

Industries: Historically, fishing and fish processing have been the foundation of Kodiak's economy. At first, the Kodiak fishery concentrated on the salmon harvest. Over recent decades, however, the trend has been toward use of other available stocks of fish and shellfish. Now, halibut, herring and herring roe, king crab, tanner crab, dungeness crab, shrimp, and other species are all harvested. Kodiak's fishing industry has thus steadily evolved from a seasonal salmon fishery to a more diversified year-round industry with suitably diversified fishing fleets and processing plants.

The no sale case economic forecast assumes that this trend toward diversification will continue. Most notably, the forecast assumes that Kodiak will lead an expansion of fishing effort and processing capability for bottomfish that will make Kodiak the center of bottomfishing and processing across the Gulf of Alaska. A 1979 study done for the State of Alaska by Denconsult estimated a potential annual domestic harvest of 149000 metric tons of groundfish in the Kodiak and Chirikof sectors of the Gulf of Alaska. Kodiak, already the region's premier fishing port, is advantageously located in relation to the Kodiak grounds and the grounds off the Alaska Peninsula and the Gulf of Alaska.

Compared to competing ports, Kodiak is a large settlement with an existing community infrastructure and a relatively large labor force. These various factors favor Kodiak's emergence as the region's leading port for the bottomfishing fleet and for bottomfish processing.

It is also expected that the traditional established fishing industry will gradually increase and prosper during the forecast period. In particular, it is anticipated that better scientific understanding and improved resource management practices will enhance and stabilize yields, allowing more efficient use of gear, plant, and labor force.

Another resource-based industry, which is expected to prosper, is the wood products industry. Under terms of the Alaska Native Claims Settlement Act, extensive timber lands will be transferred to private ownership of Native corporations and, presumably, harvested for revenue purposes.

The tourism and recreation industry is expected to show modest growth. Promotion of Kodiak's historical and recreational assets and improved visitor facilities should attract increased numbers of tourists, conventioneers, and vacationers to the Kodiak area.

The Kodiak Coast Guard station, currently a major military installation with about 980 military personnel and an on-base population of about 2,500 people, is forecast to remain at about its current strength. However, a modest increase is foreseen in civilian employment at the base.

Kodiak already has an unusually well-balanced trade and services sector for a town of its size, and it is anticipated that expansion of tourist and bottomfishing industries will reinforce the basic component of these sectors.

Employment: The no sale case future employment forecast for the Kodiak area estimates that employment will grow from 5,937 in 1978 to 10,628 by 2000 (Alaska Consultants, Inc., 1979). This is an overall increase of about 79 percent of equivalent to an average annual growth rate of about 2.7 percent. With the exceptions noted below, the structure of Kodiak's economy is expected to persist relatively unchanged.

The basic employment categories of manufacturing (largely logging and fish processing) and agriculture, forestry, and fisheries (largely fishing) are projected to grow by about 75 percent, accounting for about 40 percent of all employment growth in the forecast period and setting the pace for the secondary economy.. Trade and services exhibit the fastest growth rate, together generating about 36 percent of all new jobs. Together, these four economic sectors provide about three-quarters of the Kodiak area's economic growth.

Mainly because the Coast Guard station, the chief public employer, is not expected to expand its operations, the overall role of public sector employment will decline from 33 percent to 23 percent of total employment by the year 2000. In fact, government is the slowest growing economic sector.

The remaining sectors of contract construction, transportation, finance, insurance and real estate, and mining comprise a minor, if essential, share of about 10 percent of the baseline employment and maintain that share through the forecast period.

The employment forecast is for the Kodiak area as a whole and does not yield a separate breakdown for the city of Kodiak and the rest of the road-connected area. Nevertheless, it seems reasonable to assume that most of the employment growth under the base case will be concentrated in or very close to the city itself, as that is where the seafood industry is already established.

Local Government Finances: In fiscal year 1977, the city of Kodiak obtained most of its general fund revenues from local sources. Sales taxes (36%), property taxes (16%), and a variety of service charges and miscellaneous other sources (26%) provided over three-fourths of the city's general fund income. Intergovernmental transfers, mainly Federal and State revenue-sharing, accounted for the remaining 22 percent.

For the future, it is assumed that the city's revenues will grow at the same rate as its population grow. By this standard, the city's 1978 general fund income of about $3,500,000 annually is forecast to climb to about $8,300,000 by 2000 (Alaska Consultants, Inc., 1979).

As for base case operating expenditures, it is assumed that the city will continue to maintain about the same level of services for the same level of per capita cost as it does at present. About two-thirds of the projected growth in the base case is allotted to the city of Kodiak, so the brunt of the fiscal impact from growth will land upon the city. However, this impact will be tempered by the fact that the borough government administers and finances the local share of educational services as well as certain other areawide services (Alaska Consultants, Inc., 1979). Also, certain utility services in Kodiak, such as power and telephone, are financed and supplied through independent public and private utilities.

At present, the city's general financial position, in terms of its per capita debt, ratio of debt to valuation, property tax rates, and other indexes of fiscal soundness, is roughly equal or superior to the average of other Alaskan municipalities. However, if the city commits itself to major new public works projects to accommodate growth, then its added debt service demands may compel the city to tap new revenue sources.

Kodiak Villages

Without the proposed sale, the future of the six Kodiak villages is likely to bring little, or at least relatively modest, change within the forseeable future. Village employment is principally in commercial fishing which offers a high degree of flexibility and freedom in pursuit of subsistence lifestyles. Seasonality of employment is distinct, further reflecting a preference toward the rural, subsistence lifestyle. Employment in the commercial salmon industry is evidenced by the seasonality levels shown in table III.H.2.b.-1.

Of the six villages, all but Port Lions (built in 1964) are over 100 years old and at least two have been reported as being 2,000 years old. Rates of growth are of little significance given the small populations, and the length of

Table III.H.2.b.-1
Village Employment

Village	Workforce Estimate	Summer Employment	Year-Round Employment
Akhiok	40	32	5
Karluk	31	20	5
Larsen Bay	52	100	6
Old Harbor	190	100	13
Ouzinkie	64	55	6
Port Lions	166	52	26

Source: Kodiak Area Native Association, 1979. Five-Year Regional Health Plan.

occupancy for all villages except Port Lions. The estimated rate of growth for Port Lions is 3 percent per year, and 2 percent per year for the other five villages.

The higher rate of growth for Port Lions is due to the apparent desire of residents to encourage community growth. The growth oriented attitude is evidenced by project proposals in the Overall Economic Development Plan (KANA, 1978-80), the response of local residents to questions posed during the BLM/OCS scoping process, and the orientation of local government towards providing services and infrastructure for prospective business.

Kenai-Cook Inlet Census Division

The following forecast of the Kenai-Cook Inlet Census division and the city's future without the proposal is taken from Alaska Consultants, Inc., 1980, Technical Report Number 46. The reader is referred to this document for details not contained in this text.

The base case forecast of employment and population growth for the cities of Kenai, Soldotna, and Homer was derived from an overall analysis of the economy of the Kenai-Cook Inlet Census Division, which comprises the western half of the Kenai Peninsula Borough.

For the forecast period, anticipated trends in the region's economic base were assessed and, upon this assessment, sector-by-sector growth rates were projected for future employment in the Kenai-Cook Inlet labor area and the Homer labor area.

Two events were segregated and treated as separate incremental contributors to the region's economic growth, apart from the economic base analysis: the first-generation OCS sale CI, and construction and operation of the proposed Pacific-Alaska LNG plant at North Kenai. The employment attributable to these two projects was individually estimated and then incorporated into the employment forecasts for the Kenai-Cook Inlet and Homer labor areas. Next, by use of a population/employment ratio, population estimates were calculated for the Kenai-Cook Inlet and Homer labor areas. Finally, each labor area's population estimate was subdivided among the cities and their respective hinterlands.

Thus, this base case forecast is not a non-OCS forecast. It does include a level of OCS activity corresponding to a medium level of exploration success in sale CI as well as a strong base level of oil and gas-related industrial facilities developed for earlier leases in Cook Inlet. This aspect of the base case assumes significance in the impact assessment of the petroleum scenarios since it presents a situation in which many sale 60 activities can draw upon industrial facilities with excess capacity due to the decline of earlier producing fields.

The sector-by-sector analysis of regional economic trends follows.

Oil and Gas: An inelastic demand for petroleum will exist throughout the planning period from 1980 through 2000 for Cook Inlet petroleum resources.

Although petroleum production from existing upper Cook Inlet oil and gas fields will be declining throughout the planning period, strong demand for domestic oil and gas production will result in tertiary recovery from these fields through the year 2000. In addition, new petroleum production is assumed from State leases in the Cook Inlet area (and from offshore leases in OCS lease sale CI). It is also assumed that the existing and forecast natural gas reserves are sufficient to maintain current levels of production throughout the forecast.

Any shortfall in crude oil production from Cook Inlet fields supplying Cook Inlet refineries is assumed to be offset by crude oil importation from other areas of Alaska or elsewhere. Thus, these facilities are assumed to operate at or above current levels throughout the planning period. However, substantial additions to processing capacity are not seen to occur during the period of forecast.

Possible declines in petroleum-related employment due to production from upper Cook Inlet platforms ceasing are assumed to be more than compensated for by increases in oil service industry employment resulting from servicing oil developments in other areas of the state.

Fishing and Seafood Processing: Growth in fishing and seafood processing employment is assumed to result from increased yields in the traditional fisheries of the Kenai-Cook Inlet area and successful entry and exploitation of deep sea fishing resources.

The harvesting and processing of deep sea fishery resources (or so called groundfish or bottomfish) are assumed to take place in the southern Kenai Peninsula area, particularly Homer. Also, some supply of bottomfish to offshore processing vessels by fishing boats based in this area is foreseen.

Although involvement in deep sea fisheries is forecast to result in substantial employment increases, the sum of the increase in employment in the fishing and fish processing sector is assumed to be even greater since the base which is vested in the traditional fisheries also is forecast to increase. These increases are based in part upon increased knowledge and experience by the State of Alaska in the management of traditional species such as salmon, king crab, tanner crab, and other species taken in this area. This more capable management will enable the regulatory authorities to stabilize the production of these fisheries and permit catches approaching optimum yields.

It is also assumed that further diversification of fisheries products with the addition of bottomfish as an example and the fisheries product mix in Cook Inlet plants, especially the southern Kenai Peninsula plants, will result in a substantial year-round operation with a more stable resident labor force in the fishing and fish processing sector.

Improved management and greater yields in Alaska's fisheries districts will continue to result in part from the 200-mile offshore limit imposed by the United States, and the recently agreed upon U.S./Japan treaty which limits Japanese salmon catches beyond the 200-mile limit.

Overall, it is assumed that the improved management of Alaska fishery resources gained through law, treaty, knowledge, and experience will result in a more dependable and larger harvest of fisheries resources during the period of this forecast.

Tourism and Recreation: The tourism and recreation industry is forecast to become a more significant factor in the economic growth to the Kenai-Cook Inlet area. General population growth, as forecast for the south-central region by the Institute of Social and Economic Research for a "moderate base case," together with increased visitor traffic to the Kenai Peninsula Borough originating outside the state, are expected to intensify use of the area's tourism and recreational assets. The tourism and recreation sector within the Kenai-Cook Inlet area is seen responding to this increased potential by providing the facilities and services necessary to support increased tourism and recreation.

The Kenai-Cook Inlet area will continue to attract a large share of the total visitor traffic originating from the Anchorage area. Especially important in attracting and accommodating visitor traffic will be the Homer area although all areas within the Kenai-Cook Inlet area will realize visitation increases.

Logging and Wood Products: Although the Kenai-Cook Inlet area contains substantial timber resources with major wood processing plants located at Jakolof Bay and Tyonek, conflicts with the fishing and fish processing industry and the tourist and recreation industry are seen as inhibiting factors to further growth.

Logging and wood processing currently occupy a small position in the economy and basic employment of the Kenai-Cook Inlet area and, despite the potential of this industry to expand, it is assumed to remain at current levels throughout the forecast period, for reasons noted in the preceding paragraph.

Government: A modest rate of growth is assumed to take place in basic government employment during the forecast period. Increases in resident population and visitors, especially those engaged in tourism and recreation, are assumed to result in the need for more intensive management in areas of fish and wildlife. Additional basic Federal employees are seen to be needed to protect and manage the fish and wildlife within the Kenai Moose Range. Also, additional basic State employees will be required to protect the productive fish streams, rivers, and beaches of this area as well as to manage State Parks and recreational facilities provided to accommodate visitors.

Increased offshore activities in petroleum development and deep sea fishing as well as increased recreational boating will necessitate increases in U.S. Coast Guard employment. In the air, increases in fixed wing and helicopter traffic resulting from offshore development and general economic and population growth will result in increased basic Federal and State employment. It is assumed at the State and local level that substantial intergovernmental transfers, principally in the form of grant funds, resulting in basic employment within the Kenai-Cook Inlet area will be maintained roughly in proportion to increases in population within the area.

In summary, increases in basic employment during the period of the forecast are assumed to result from the same natural resource-based industries now supporting basic employment in the area. However, these industries are forecast to range further from the Kenai-Cook Inlet area in providing the products supporting basic employment. The fishing industry is forecast to range further into the ocean for bottomfish. The petroleum industry will move further out on the continental shelf to produce oil and gas and utilize more extensive methods to realize tertiary recovery from existing fields. And greater numbers of visitors will travel to the area from greater distances to enjoy tourist and recreation opportunities on the lands and waters of the Kenai-Cook Inlet area.

In the principal sectors, basic employment in agriculture, forestry, and fisheries is forecast to increase in the Kenai-Cook Inlet Census Division at 4 percent per year from 1979 to 1990 and 2.5 percent per year from 1991 to 2000. This increase is based solely upon growth in the fisheries with bottomfishing being a major factor. Since a large portion of the growth is forecast to take place through bottomfishing and through greater yields in the total mix of fish catches, the southern Kenai Peninsula area is forecast to experience greater growth. Homer area basic employment in agriculture, forestry and fisheries is forecast to increase at a rate of 5 percent per year from 1979 to 1990 and 3 percent per year from 1991 to 2000. On the other hand, basic employment in this sector in the Kenai-Soldotna area, where salmon fishing dominates, is forecast to increase steadily at 1.5 percent per year throughout the planning period.

Basic employment in manufacturing which is vested primarily in petroleum processing and seafood processing is forecast to increase at a modest 2 percent per year in the non-OCS forecast for the Kenai-Cook Inlet Census Division. (The inclusion of the OCS sale CI in the base case does not alter this growth since the same facilities and employment are used to process the petroleum production of sale CI. However, it results in maintaining a share of petroleum employment at current levels.)

Of course, basic employment growth varies for the area under study within the Kenai-Cook Inlet Census Division. The Homer area, whose basic manufacturing employment is vested in seafood processing, is forecast to increase at 5 percent per year from 1979 to 1990 and 3 percent per year from 1991 to 2000. In the Kenai-Soldotna area, where petroleum processing employment dominates, basic employment is expected to increase at 2 percent per year throughout the forecast period.

Basic non-OCS employment in mining in the Kenai-Cook Inlet Census Division is located almost exclusively in the Kenai-Soldotna area and is almost exclusively petroleum industry related employment. This basic employment sector is forecast to increase by 1.0 percent per year in the Kenai-Soldotna area, whereas no employment is recorded in this sector in the Homer area.

The distributive industry sectors of transportation, communications, and public utilities, trade and services support basic non-OCS employment in the Kenai-Cook Inlet Census Division through provision of goods and services primarily to basic industries, visitors, transient fishing vessels and offshore petroleum operations.

Basic employment in transportation, communications, and public utilities is forecast to increase at 3.5 percent per year throughout the planning period in the Kenai-Cook Inlet Census Division. The Kenai-Soldotna area where this sector, especially in transportation, is extensively developed, is forecast to increase at 3 percent per year from 1979 to 2000. Some economies of scale are seen in this sector. The Homer area, with a less developed basic economy in this sector, is forecast to increase at 4 percent per year throughout the forecast period.

Activities in the trade sector and service sector are forecast to result in a basic employment growth of 3.75 percent per year in the Kenai-Cook Inlet Census Division. Primarily because of tourism and recreation, basic employment in the Homer area is forecast to increase at 4 percent per year while lesser involvement in the Kenai-Soldotna area will result in an annual growth of 3.5 percent for the length of the forecast.

Basic employment in the sectors of contract construction and finance, insurance and real estate facilitate the development of basic economic activities such as petroleum development. The basic employment in the Kenai-Cook Inlet Census Division is forecast to increase at 3.5 percent per year. Basic employment in the Homer area is somewhat higher at 4 percent per year in each of these sectors while in the Kenai-Soldotna area both sectors are forecast to increase by 3 percent per year throughout the forecast period.

The forecast for basic employment in the Government sector in the Kenai-Cook Inlet Census Division area as a whole and the Kenai-Soldotna and Homer areas is forecast at 3 percent per year throughout the period of the forecast.

The overall growth rate in basic employment for all industry sectors in the Kenai-Cook Inlet Census Division is estimated at approximately 2.8 percent per year, with the Homer area increasing at about 3.8 percent per year, and the Kenai-Soldotna area increasing roughly at 2.4 percent per year.

Secondary Employment: Since the existence of service employment is dependent upon expenditures of the basic sector, service employment can be derived roughly from basic employment through the use of a multiplier to elicit total employment. Total employment minus basic employment equals service employment.

The 1979 employment estimate by Alaska Consultants, Inc., derived from Alaska Department of Labor, Employment Security Division statistics for the Kenai-Cook Inlet labor area totaled 7,795. Estimates of basic and service employment were 4,451 and 3,344 respectively. Thus, the multiplier derived is 1.75. The multiplier appears reasonably representative of an area in which there is a mixture of stable, year-round industrial employment with high wage rates and seasonal activities with large transient work forces.

The sum of the basic employment in the industrial sectors for each of the years forecast multiplied by the multiplier of 1.75 produces the estimate of total employment for each year. Of course, there are many factors which could result in the multiplier changing. However, rather than speculating upon these changes, the multiplier is assumed to be constant throughout the forecast period.

Total Employment: Since the multiplier of basic to secondary employment is assumed to remain constant during the forecast period, the rate of increase in basic employment is equal to the rate of increase in total employment. Therefore, the Kenai-Cook Inlet labor area, in which total employment is forecast to increase from an estimated 7,795 employees in the 1979 base year to 15,794 employees estimated in the year 2000, is forecast to increase by approximately 2.8 percent per year.

The Kenai-Soldotna area is projected to increase from an estimated 5,075 employees in 1979 to 8,246 in 2000, or by about 2.4 percent per year. The

Homer area is projected to increase by approximately 3.8 percent annually or from 1,621 employees in 1979 to 3,619 employees in 2000.

OCS Sale CI

Employment: The sale CI portion of the base case employment and population is derived from a petroleum scenario which is assumed to be representative of a medium find scenario for the current OCS lease sale CI medium find scenario.

Since sale CI concludes within the period of the base case forecast, the annual additions of sale CI employment and population to the non-OCS forecast result in higher annual averages and intermediate changes in the rates of growth, but do not alter the long-term growth rates from the 1979 base year to the end of the forecast period in 2000. However, sale CI is foreseen to assure the utilization of existing Cook Inlet petroleum facilities at or near capacity. Although no tertiary recovery is assumed in this scenario, should the level of production in the forecast result, there is a distinct probability of tertiary recovery under the assumption for the non-OCS forecast.

A forecast of employment related to the medium find scenario for sale CI is shown in Alaska Consultants, Inc., 1980, Volume II.

Proposed Pacific Alaska LNG Plant

Employment: In order to portray the proposed Pacific Alaska LNG facility as an element in the base case of employment and population, a scenario involving only the construction and operations employment was developed. The facility as currently proposed by the Pacific Alaska LNG Company is assumed to have a capacity of 400 million cubic feet per day. The timing and direct employment required in the construction and operation of this facility were obtained from the Institute of Social and Economic Research (ISER), University of Alaska. These were used by ISER in the "Lower Cook Inlet, State-wide and Regional Population and Economic Projections." Construction is forecast to take place beginning in 1980, and concluding with a finished plant during 1983. Production is assumed to begin in 1984 and to extend at full production beyond the year 2000. (See Alaska Consultants, Inc., 1980 for spatial distribution of employment.)

Total Base Case Employment

Base Case Total Employment Forecast: This forecast is derived below from the non-OCS cases plus the CI and pacific LNG effects.

For purposes of forecasting future employment levels, an overall projection was first developed for the regional economy, that is, for the Kenai-Cook Inlet Census Division. Then, on the basis of past and anticipated economic trends, a share of the regional projection was assigned to the Kenai-Soldotna and Homer labor areas. Individual employment forecasts were not developed for each city in view of the high work force mobility within the economic subareas and in view of the fact that resident population, not employment, was the critical variable for estimating community impacts.

Kenai-Soldotna Labor Area: Base case employment in the Kenai-Soldotna area is projected to increase from 5,386 jobs in 1980 to 8,336 jobs by 2000. The pace of expansion is generally expected to be steady, with the exception of a strong surge in construction employment during the building of the proposed Pacific Alaska LNG plant scheduled for 1981-84. At peak, this project creates up to 1,323 direct jobs. Many of these short-term construction jobs are assumed to be filled by a temporary work force residing in camp facilities at the project site. Other noteworthy sectors of basic growth include continuing oil and gas development related to sale CI and to other State leases and the transportation industry.

Kenai's Local Government Finances: In fiscal year 1978, the city of Kenai obtained most of its revenue from local sources. Property taxes (42%), sales taxes (26%) and a variety of service charges and miscellaneous other sources (8%) provided over three-fourths of the City's general fund income. Intergovernmental transfers, mainly from Federal and State revenue sharing, accounted for the remaining 24 percent.

For the future, it is assumed that the city's revenues will grow at the same rate as its population grows. By this standard, the city's 1982 general revenue fund income estimate of $3,560,000 annually is forecast to climb to about $5,000,000 by 2000.

As for operating expenditures, under the base case, it is assumed that the city of Kenai will continue to maintain about the same level of services at about the same level of per capita cost as it does at present. Only about one-third of the projected growth in the Central Peninsula area under the base case is allotted to Kenai, so the brunt of the fiscal impact of growth on the city will be somewhat mitigated. Fiscal impact will be further tempered by the fact that the borough government administers and funds the local share of educational services as well as certain other areawide services such as garbage disposal and hospital services. In addition, certain utility services in Kenai, such as power and telephone, are financed through independent public and private utilities.

At present, the city's general financial position in terms of its per capita debt, ratio of debt to valuation, property valuation per capita, property tax rates and other indexes of fiscal soundness are about equal to or poorer than the average of other Alaskan municipalities. This suggests that Kenai may have some difficulty financing future capital improvements within its existing fiscal framework and may, instead, have to rely on State and Federal grants to finance new facilities or develop new revenue sources.

Kenai's Economic Prospects: Under the base case, growth impacts at Kenai are expected to stem from consolidation of its position in the economic functions that now support the community. Continuing economic growth is forecast, but with no noteworthy sudden departures from recent economic trends. The Kenai area will maintain its oil and gas and petrochemical base, drawing upon existing and yet-to-be proven hydrocarbon reserves anticipated from new State leases and sale CI. An additional LNG plant will be constructed as scheduled. Expanded commercial fisheries and fish processing and tourism industries are expected to support some growth.

The pace of population growth, estimated to average about 2 percent annually, is even slower than during the post-1970 period and is quite different from the explosive growth pattern of the 1960-70 decade. In summary, the base case projection envisions a diminished rate of economic and population growth for the city of Kenai.

Soldotna's Local Government Finances: As of 1978, nearly five-sixths of Soldotna's general fund revenues were raised locally from property taxes (29%), local sales tax (30%), and miscellaneous other local revenue sources (24%). Only about 17 percent of general fund revenues were derived from intergovernmental transfers. Since 1974, the city's mil rate has fallen considerably from 20.20 to 16.10 mils, a trend which is probably related to a period of rapid expansion in the city's residential and commercial property tax base.

For the base case forecast, it is assumed that the city's revenues will increase at a rate proportionate to population growth. By this assumption, the city's 1982 estimated general fund revenues of about $1,913,000 will climb to about $3,165,000 by the year 2000, an overall increase of 65 percent.

Under the base case, it is also assumed that the city will maintain its customary mix and quality of municipal services and facilities and that its general fund expenditures will have to be maintained at about the same per capita level as prevailed at the outset of the forecast period. Thus, general fund operating expenditures are estimated to grow by 65 percent from about $1,618,000 in 1982 to $2,677,000 by 2000. Operating expenditures are projected to consume about 85 percent of general fund receipts, with the remainder available for capital improvements and debt service.

At present, the city's overall financial situation seems improved over recent years. The city's per capita valuation is now typical of middle-sized Alaska cities, thanks to recent town development. However, it should be noted that Soldotna's role as a residential community and governmental and commercial center for the central peninsula area may help perpetuate an imbalanced and relatively disadvantageous property tax base structure for Soldotna. The city must rely heavily on residential and commercial development for revenues, since it does not have tax access to the highly valued industrial plants in the north Kenai-Nikiski industrial complex which employs so many of the area's residents.

The city of Soldotna now experiences a relatively high indebtedness ratio when the city's own debt is combined with the city's share of borough indebtedness. This situation, in conjunction with the above-mentioned imbalance in its property tax base, may place financial strain upon the city's debt capacity, if major capital improvements are needed during the forecast period.

Soldotna's Economic Prospects: Soldotna is estimated to grow at an annual rate of about 3 percent under the base case forecast. This growth rate is slower than in the previous decade and much slower than the decade before that. Soldotna's growth is linked to its role as a residential community and commercial and service center for the central peninsula area upon whose overall economic vitality its own prosperity depends. It is not anticipated that any major new industrial employers will locate within Soldotna, although the city is expected to capture a part of the region's resident offshore work force for sale CI.

Homer Labor Area: The employment forecast for the Homer area anticipates rapid, steady growth over the next two decades. Particularly strong advances are projected for the fishing and fish processing industry, partly as a result of exploitation of groundfish resources. The trade and services sector of the economy is expected to exhibit strong growth, due to expansion in Homer's tourism industry and diversification of the local service economy. Sale CI is potentially also a major growth factor: the medium find scenario assumed for that sale is estimated to generate as many as 407 jobs in the Homer area, about 14 percent of total local employment.

Overall, Homer area employment is forecast to more than double from 1,742 jobs in 1980 to 3,619 by 2000 (Alaska Consultants Inc., 1980).

Local Government Finances: As of fiscal year 1978, the most recent year for which data is available, local property taxes were the main source of general fund revenues for the city of Homer, providing about 55 percent of the city's general fund income. Various other local revenues account for another 9 percent of general funds while intergovernmental transfers account for the remaining 36 percent, better than one-third of all general funds.

As a general rule, it is expected that the city's revenues will increase in proportion to its population growth. By this standard, it is estimated that the city's general fund income of approximately $910,000 as of fiscal year 1978, will reach about $2,400,000 by the close of the forecast period, or an increase of about 164 percent.

In the base case forecast, it is also assumed that the city will maintain essentially the variety and level of public services at about the same relative level of per capita cost as it does at present. Thus operating expenditures are projected to grow at about the same rate as general fund income. If this relationship between growth in revenues and expenditures persists, then the city should receive income in excess of operating needs to apply to capital expenditures and debt service. Also, if the city maintains its 3 percent sales tax, which is at present earmarked for debt service, those additional revenues may also be applied to capital improvement needs.

The city of Homer's present financial status appears to be representative of medium-sized Alaska municipalities in regard to its per capita assessed valuation and better than average in its ratio of bonded debt to valuation. This last factor is important, since it appears that the city may be called upon to sponsor public improvements for water supply and waste treatment in the near future to serve a rapidly growing population.

Homer's Economic Prospects: The economic base analysis indicates that the city of Homer's growth will be stimulated by a continuing dynamic economy during the forecast. Strong growth in a number of different sectors is expected to contribute. Development of a groundfish industry in lower Cook Inlet waters will likely be based at Homer's port, which will also benefit from improved economic conditions in the traditional fisheries. Homer is also advantageously located to serve as the home community for a substantial share of the permanent offshore work force operating the fields developed in sale CI lease areas. Finally, Homer's continuing appeal as a tourism and recreation center can support further expansion in the trade and services sectors of its economy.

The net result of these factors is that Homer, the smallest in population of the three cities, is projected to grow at the fastest rate, about 4.5 percent annually, for a cumulative increase of 153 percent over the forecast period. For a community of Homer's size, this is a high rate of sustained growth.

APPENDIX X

COMMENTS RECEIVED FROM AGENCIES, ORGANIZATIONS, AND INDIVIDUALS REGARDING THE DEIS FOR PROPOSED SALE 60

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE

P.O. Box 1628, Juneau, Alaska 99802

1950

October 7, 1980

Ms. Esther C. Wunnicke
Manager, Alaska Outer Continental
  Shelf Office
USDI Bureau of Land Management
P. O. Box 1159
Anchorage, Alaska 99510

Dear Ms. Wunnicke:

We have reviewed the Draft Environmental Impact Statement relating to Oil and Gas Sale #60.

Afognak Island is affected by the proposed sale in several ways, as you have pointed out. The draft should also indicate that Afognak and Ban Islands are currently involved in legislation being considered by the Congress. This legislation would include all public lands on Afognak and the small adjacent islands into the Kodiak National Wildlife Refuge.

Two sections of Afognak and Ban Islands were withdrawn under Section 204(b)(1) of the Federal Land Policy and Management Act of 1976 (PL 94-579) in December of 1978 for a period of 2 years pending Congressional action. Extension of this segregation is the subject of the enclosed Draft Environmental Impact Statement prepared by the Forest Service. As noted in this draft, two areas withdrawn are proposed for incorporation into the Wilderness Preservation System by the Administration.

The pending actions outlined above could potentially affect the oil and gas sale, especially as they relate to onshore developments which may be needed on Afognak or Ban Islands.

We appreciate the opportunity to comment on your proposal.

Sincerely,

for R J Cear L
JOHN A. SANDOR
Regional Forester

Enclosure

___ Mgr. ___
___ Asst. Mgr. ___
___ SE Staff Ldr. ___
___ ES Staff Ldr. ___
___ PIO ___
___ Chief, Ops ___
1 Chief, EA ___
___ Chief, MS ___
___ Supv. CA ___
2 ___ ___
___ ___ ___
A-Action
I-Info

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON 20426

IN REPLY REFER TO:

Manager, Alaska OCS Office
Bureau of Land Management
P.O. Box 1159
Anchorage, Alaska 99510

OCT 22 1980

Dear Sir:

We appreciate the opportunity to comment on the draft environmental impact statement (DEIS) evaluating the proposed Alaska Outer Continental Shelf (OCS) Oil and Gas Lease Sale 60 in the Lower Cook Inlet-Shelikof Strait. The Office of Pipeline and Producer Regulation of the Federal Energy Regulatory Commission offers the following comment.

The DEIS indicates on pages 24 and 132 that tanker shipment of liquefied natural gas (LNG) would be the probable mode of transportation for any future natural gas discovered in the proposed Lease Sale 60 area. However, the DEIS does not adequately describe the current status of LNG receiving facilities on the west coast. For instance, on September 26, 1979, the FERC conditionally approved construction of an LNG import facility at Point Conception, California, to receive LNG from Indonesia and from Cook Inlet in Alaska. The Point Conception facility would eventually vaporize LNG at an average plant output of 900 million cubic feet per day (cfd), with additional peaking capacity of 300 million cfd. The Alaskan portion of this project would transport gas by pipeline from production fields in Cook Inlet to an LNG plant in the Nikiski industrial complex. LNG would then be transported by tanker, and after revaporization, would be delivered for sale to markets in southern California. This system would initially transport 200 million cfd of gas, reaching an eventual project total of 400 million cfd. As the DEIS suggests, this facility would have to be expanded to handle the additional gas supplies resulting from the proposed lease sale. Such an expansion would be subject to FERC review and approval. At the present time, the Point Conception terminal is being further analyzed by both this Commission and the California Public Utilities Commission and, if constructed, would be the only LNG receiving facility on the west coast.

The Commission is directing its attention and efforts toward regulatory actions to improve domestic natural gas supplies. The

Commission staff recognizes the national importance of OCS exploration and development, as well as the need for effective environmental safeguards. Based upon a review of your DEIS, we believe that the proposed OCS oil and gas lease sale is in the national interest.

Very truly yours,

Eugene C Gamboni for
Kenneth A. Williams, Director
Office of Pipeline and Producer
Regulation

cc: Director (540)
Bureau of Land Management
Washington, D.C. 20240

DEPARTMENT TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
ALASKAN REGION
701 C STREET BOX 14
ANCHORAGE, ALASKA 99513

Oct 29 12 43 PM '80

October 23, 1980

Ms. Connie Wassink
Department of the Interior
Bureau of Land Management - OCS
P.O. Box 1159
Anchorage, AK 99510

Dear Ms. Wassink:

We have reviewed those sections of the Lower Cook Inlet-Shelikof Strait Oil and Gas Lease Sale, DEIS, relating to the potential impacts of the proposed project on the Air Transportation System and feel that the areas are adequately covered. Therefore, we have no additional comment.

Sincerely,

FRANK AUSTIN
Acting Chief, Planning
and Appraisal Staff

Mgr.
Asst. Mgr.
SE Staff Ldr.
ES Staff Ldr.
✓ PIO
Chief, Ops
✓ Chief, EA
Chief, MS
Supv. CA
A-Action
I-Info

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD
MAILING ADDRESS G-WS/TP11
U.S. COAST GUARD
WASHINGTON, DC 20590
PHONE: 202-426-2262

30 OCT 1980

Manager, Alaska OCS Office
Bureau of Land Management
P.O. Box 1159
Anchorage, Alaska 99510

Dear Sir:

This is in response to your letter 1792#60(542) of August 7, 1980 addressed to the Director, Office of Environmental Quality concerning a draft environmental statement on the proposed outer Continental Shelf oil and gas lease Sale (OCS Sale No. 60), Lower Cook Inlet/Shelikof Strait, Alaska.

The concerned operating administrations and staff of the Department of Transportation have reviewed the material submitted. We have no comments to make nor do we have any objections to this statement.

The opportunity to review this draft statement is appreciated.

Sincerely,

W.R. RIEDEL
Chief, Ports and Waterways
Planning Staff

SPEED LIMIT
55
It's a law we can live with.

United States Department of the Interior
HERITAGE CONSERVATION AND RECREATION SERVICE
WASHINGTON, D.C. 20240

REPLY REFER TO:

OCT 21 1980

Memorandum

To: Director, Bureau of Land Management

From: Director, Heritage Conservation and Recreation Service

Subject: Review of Draft Environmental Statement for Proposed 1980 Outer Continental Shelf Oil and Gas Lease Sale No. 60 (DES-80/52)

In response to your memorandum of August 5, 1980, we have reviewed the subject document and have the following comments.

Cultural Resources

The draft environmental statement has adequately addressed cultural resources.

We are glad to see evidence of close coordination between the Bureau of Land Management Outer Continental Shelf Office and the Alaska State Historic Preservation Office.

As the Heritage Conservation and Recreation Service has been involved locally and nationally in the development of regulations concerning the protection of cultural resources, we would be glad to assist in the development of new procedures to ensure protection of submerged cultural resources, as mentioned on p. 208. Please contact Bennie Keele, Departmental Consulting Archeologist in Washington, D.C. (343-7105), or Floyd Sharrock at the HCRS Alaska Area Office, (277-1666).

Recreation

The draft statement has identified general impacts to recreation and reflects resource planning coordination at the local, state and federal level. The final document can be improved, however, if attention is given to the following discrepancies and/or deficiencies.

According to the Alaska Division of Parks staff, the recreation resource inventory of "Areas of Particular Concern (Alaska Peninsula)" depicted in Graphic No. 15 is incomplete when compared to the total number of

Received in BLM WO 202-B
OCT 23 1980

areas identified in the Division of Parks' reports referenced by the draft statement. The map legend or narrative should identify the criteria used in selecting those "areas of particular concern" presented in Graphic 15.

The Kenai River was apparently overlooked and should be added to the list of most heavily used recreation resources on the Kenai Peninsula as identified in the narrative (under Recreation Resources, Kenai Peninsula, paragraph two) for Graphic 15.

There appears to be a contradiction in the description of the impact associated with the proposed pipeline between Chernof Point and Talnik Point. On page 211, paragraph two, the discussion of the impact of pipeline construction on the wilderness character of the area indicates that it would be temporary while paragraph number 5 "Visual and Wilderness Resources" on page 281 states that there would be an irreversible commitment of wilderness in certain locations of the Kodiak Archipelago. Also, the last paragraph of the Summary Sheet (page iv) indicates that a roadway in the area of Talnik Point would be necessary to service the onshore pipeline. The final statement should clarify the impact, if any, that will be associated with the pipeline.

National Natural Landmarks

The McNeil River Brown Bear Refuge, Illiamma Volcano and Redoubt Volcano National Natural Landmarks are located adjacent to, or in close proximity of, the project area and should perhaps be identified in the resource inventory of the final statement. Additional potential National Natural Landmarks may be identified in or adjacent to the project area by the ongoing Pacific Mountain System Natural Landmark Theme Study scheduled for completion in January, 1981. We will keep the Anchorage BLM/OCS office apprised of pertinent Theme Study recommendations.

Harold
for CTD

United States Department of the Interior
GEOLOGICAL SURVEY
RESTON, VA 22092

OCT 23 1980

Memorandum

To: Director, Bureau of Land Management

Through: For Assistant Secretary-Energy and Minerals

OCT 24 1980

From: Director, Geological Survey

Subject: Review of draft environmental statement for OCS Oil and Gas Lease Sale No. 60, Lower Cook Inlet-Shelikof Strait, Alaska

We have reviewed the draft statement as requested in your memorandum of August 5.

We recommend a more realistic assessment of the ambient air quality for offshore sources and an evaluation of potential impacts on coastal aquifers. We also note technical inadequacies in the treatment of cultural resources.

Our specific comments are presented in the enclosure.

for H. William Menard

Enclosure

Page 3, sec. B, par. 2 and 3. As of June 1980, 74 not 69 of the 76 leases have been relinquished in the northern Gulf of Alaska, Lease Sale No. 39. This effort resulted in 10 dry holes. For the Lower Cook Inlet Lease Sale, as of July 1980, eight exploratory wells and one COST well have been drilled in the area.

Page 24. The production level for natural gas for Alternative V is shown as 360 BFC. This is the result of a typographical error in the Geological Survey's Infrastructure Report. The figure was changed to 316 BCF in a corrective memorandum dated November 11, 1979.

Page 24. The production levels of oil and natural gas for Alternative VI are listed as being 335 MMbbls and 586 BCF, respectively. These figures should be 346 MMbbls and 608 BCF, as shown in the Geological Survey's Infrastructure Report.

Page 25, B.1.a, par. 2. This should read "In November of 1979, the Geological Survey estimated that based on geophysical data, the 153 blocks...."

Table II.B.2.b-1, line 1. Change "6.70x10^6" to "670x10^6."

Page 43, par. 3. This should read "A summary of activities required to develop the estimated resources...."

Table II.B.4.a-1, item 1.d. This should read "production and service wells."

Table II.B.5.a-1, item 1.b. This should read "exploration and delineation wells."

Table II, B.5.a-1, items 1.d. and 3. These items should read "production and service wells."

Page 44, 5.a. Resource estimates for this alternative should be 360 BCF of gas, thus reducing the estimated recoverable resources by some 813 BCF of gas.

Page 44, par. 1. This should read "exploration is hypothesized to begin in 1983 and continue through 1985 with a total of five exploration and delineation wells drilled."

Page 44, par. 6. Oil and gas production would begin in 1987.

Page 44, par. 7. This should read "A summary of activities required to develop the estimated mean resources...."

Page 45, 6.a, par. 2. Resource estimates for this alternative should be 346 MMbbls of oil and 606 BCF of gas, thus reducing the estimated recoverable resources by some 324 MMbbls of oil and 567 BCF of gas.

Page 46, par. 2, sentence 4. This should read "By 2,009 oil and gas production could cease."

Figure III.c.5.a-1, following p. 75. National lands should be shown on the map.

Page 118, Oil and Gas, par. 2, sentence 2. Delete "(and from offshore leases in OCS lease Sale CI)." New petroleum production should not be assumed when economic recoverable resources have not been discovered on OCS Sale CI leases.

Page 120, par. 5, sentence 2. This should read "(The inclusion of the OCS Sale CI in the base case does not alter this growth since the same facilities and employment would be used to process any petroleum production which might occur from OCS Sale CI leases...)."

Page 128, par. 2. OCS Order No. 7 now states that the disposal of drilling muds is subject to EPA permitting procedures.

Page 128, last par. Oil-based muds are not allowed in the Alaskan OCS.

Page 129, par. 5. OCS Orders set no minimum chloride standard.

Page 130, b, par. 3. This should read "For purposes of this analysis, it is estimated that as a result of this proposal there may be 195 development and service wells drilled from 4 platforms. The maximum case would involve the drilling of 295 production and service wells from 6 platforms."

Page 131, c, par. 2. This should read "For purposes of this analysis, it is assumed that 195 production and service wells would be drilled (mean case)."

Page 133, lines 5-6. Delete "The unrisked mean estimate of resources from existing leases in Lower Cook Inlet is 826 MMbbls." This is statistically incorrect. Unrisked resources for groups of leased tracts cannot be added together to arrive at a total mean estimate.

Page 133, lines 8-10. This should read "For Alternative IV, the unrisked mean estimate was calculated to be 260 MMbbls, for Alternative V, 180 million barrels, and Alternative VI, 346 MMbls."

Page 143, par. 2 and 3. Substitute "Deputy Conservation Manager" for "Oil and Gas Supervisor."

Page 150, Lower Cook Inlet Sale. This should read "To date nine dry holes have been drilled as a result of OCS Sale CI."

Page 150, sec. 2. Available information indicates that aquifers capable of yielding 10 to 100 gallons per minute occur on the Alaska Peninsula and the mainland along the west side of Cook Inlet; aquifers capable of yielding 100 to 1,000 (and in places more than 1,000) gpm occur on the Kenai Peninsula along the east side of Cook Inlet. (See Feulner, A. J., Childers, J. M., and

Normand, V. W., 1971, Water resources of Alaska: U.S. Geological Survey Open-file report.) The final statement should assess the potential for direct and indirect impacts on these aquifers that might result from exploration and production on the proposed lease areas.

Page 199, last line. This should read "(9 exploratory wells in 3 years)."

Page 208, par. 2, lines 4-5 Delete "Many areas...show evidence of man."

Page 208, par. 6, lines 4-5. This sentence is inaccurate and should be deleted.

Page 209, last par. EO 11593 and its requirement for Federal agencies to inventory their lands do not appear to apply to the OCS. The requirement to avoid cultural resources as put forth in the OCS Lands Act Amendments is applicable.

Page 210, par. 1, line 1. HCRS is not a technical advisor on day-to-day operations but "may perform" except in cases of overall studies, programs, and evaluations of technical proposals received in the cataloging process, where "shall participate" is the wording.

Page 226, par. 5. We believe it is premature to conclude that "As it now stands, the inlet is due one more drilling effort and then oil industry action is expected to cease."

Page 233, sec. p, par. 2. Because the data represent only one drilling vessel and one offshore platform, their actual representativeness should be discussed. The range of emissions by pollutant that can be expected from operations in this area should be listed and the basis for the values should be stated.

The DES attempts to assess the effects of the assumed OCS emission sources by using the three-step process (i.e., exemption screen, air-quality modeling, and controls) of the OCS air quality regulations (30 CFR 250.57). The air quality modeling assessment cannot be labeled as "worst case" and would not be acceptable for an air quality analysis required by the OCS air quality regulations.

For the scenario assessed (using the assumed total air emissions and distance), SO_2 and NO_x emissions would not be exempt by the emission threshold of the regulations. Thus, the DES used air quality modeling with assumed meteorological conditions to determine whether the emissions could significantly impact an onshore area. The meteorological conditions assumed (7.6 meters/second windspeed and Class C atmospheric stability) are not reasonable to assess the short-term (1-24 hour) onshore impacts. If air quality modeling is done, one should at a minimum review the meteorological data available in the area and use actual data that reasonably represent area conditions. For short time periods, near-worst-case meteorological conditions for the assumed scenario likely will be low windspeeds with stable atmospheric stability. Because NO_x is the most troublesome pollutant, calculating an annual average is imperative so that the estimated onshore concentrations can be compared to the annual average significance level for NO_x.

The Geological Survey has approved the use of the EPA CRSTER model for inert pollutants from single facilities, but on an interim basis only until an air quality model more suited to overwater applications is developed (45 Federal Register 37816, June 5, 1980). We recommend that the CRSTER model, a model with assumptions equivalent to CRSTER, or a model which more realistically handles overwater flow (with appropriate documentation) be used for the assessment.

An alternative to modeling would be simply to state that air quality modeling would be necessary for the non-exempt pollutants and that controls would be required for those pollutants that significantly affect an onshore area.

Page 286. We note that the list of preparers does not include an archeologist or historian.

Appendix A, table A-6, items 1.d and 3, and table A-7, items 1.d and 3. These items should read "production and service wells."

Appendix A, table A-6, last 2 lines. Change "yd^3/mi" to "yd^3."

Appendix C, OCS Orders, par. 4. Delete OCS Order No. 6.

Graphic No. 1. Bottom sediment types are omitted from at least nine areas outlined by bottom sediment boundaries. In the area between Kachemak Bay and Kennedy Entrance, symbols F and M both appear in the same area. West of English Bay and north of Kennedy Entrance are two symbols M separated by a boundary. The symbols C west of Clam Gulch and M west of Kalifonsky both appear in the same area, suggesting that the M may belong immediately west of Kenai instead. A symbol C east of Chinitna Point is in an area elsewhere identified by three M symbols. The symbol C northwest of Anchor Point is in an area continuous with the foregoing area designated by M symbols. On Chinitna Point the Upper Jurassic rocks are colored as Middle Jurassic rocks and the latter are shown blank. In areas near Wide Bay in the extreme southwest, the Tertiary Volcanic rocks are shown without their proper color. Colors are missing from several areas west and northwest of Grading Bay in the extreme northwest. The legend shows Triassic Ultramafic rocks without color, but these are shown in color on the map. Volcanic vents or cones are shown by two different symbols, both of which should be in the legend.

Graphic No. 12. The large orange area should be identified in the legend.

Graphic No. 13:

General. We are pleased that shipwreck data and prehistoric sites are no longer being treated under one category, cultural resources. The recognition that the two classes of remains are distinct is a major step in bringing order to OCS cultural-resource inventory requirements.

Col. 1, par. 1, lines 5-6. The phrase "nearly 6000 years into the past" is not consistent with chart below, which extends to 6500 B.C.

Col. 1, par. 1, chart. There are unexplained gaps in the record, from 4600 B.C. to 1500 B.C. and from 6000 B.C. to 4600 B.C.

Col. 1, par. 2, line 7, and par. 3, line 5. Ocean Bay I is first said to be characterized by flaked stone and then said to be characterized by slate working.

Col. 1, par. 3, lines 1-2. The statement that "The Ocean Bay II Phase follows directly from Ocean Bay I" is in conflict with the chart showing a 1,400-year hiatus.

Col. 1, par. 4, line 2. Is "Ocean Bay Tradition" being used interchangeably with "Ocean Bay I and II Phases"?

Col. 1, par. 4, line 21. Replace "early phase" by Old Kiavak (?) or Ocean Bay II for clarity.

Col 1, par. 4, lines 21-31. Does "early phase" (line 21) relate to "Old Kiavak Phase (line 27)? References to "more complex" (line 29) and "little elaboration" (line 30) require explanation. If "Late Kachemak" (line 31) is equivalent to "Three Saints Bay Phase" (table I), the same terminology should be used.

Col. par. 5, lines 2-3. Are "Koniag Phase" and "Koniag culture" interchangeable?

Col. 1, par. 6, last 2 lines. The references noted here should be added to the bibliography.

Col 2, par. 3. The Alaska Peninsula should be identified on Graphic 13.

Col. 2, par. 3, lines 12-20. Unless one explains what the similarities and differences are, and the significance of them, there is no point to this section.

Col. 2, par. 4, line 1. What are the "two separate archeological sequences"?

Col. 2, par. 4, lines 7-8. The Pacific shore should be identified on Graphic 13.

Col. 2, par. 7, line 4. Naknek drainage is not referred to elsewhere. What is the point of bringing it in here?

Col. 2, par. 7, lines 15-16. Brooks River Wier phase does not occur in the above table. Why insert it here?

Col. 2, par. 7, line 22. The Koniag tradition is referred to as a phase earlier.

Col. 2, par. 7, line 23. The Dumond reference should be added to the bibliography.

Col. 3, par. 1, line 6. It would be useful to include average January and June temperatures.

Col. 3, par. 5, lines 1-4. The Archaeological Resources Protection Act of 1979 protects all cultural resources, not just National Register sites.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
WASHINGTON, D.C. 20240

ADDRESS ONLY THE DIRECTOR
FISH AND WILDLIFE SERVICE

OCT 3 1

Memorandum

To: Director, Bureau of Land Management

From: Associate Director, Fish and Wildlife Service

Subject: Draft Environmental Impact Statement (DEIS) for OCS Oil and Gas Lease Sale No. 60 (Lower Cook Inlet - Shelikof Strait)

We have reviewed the subject document and feel it adequately analyzes each alternative of the proposal; however, the DEIS should address the expected cumulative impacts of Sales No. 60 and No. 61. There is the potential for the speculated impacts of Sale No. 60 to occur simultaneously with similar impacts triggered by Sale No. 61 only 18 months later.

The Service would like to take this opportunity to again recommend deletion of those tracts identified in our March 14, 1979, response to the call for nominations for this sale (copy attached). Rationale for this recommendation was a perceived need for a no-development buffer zone of at least six nautical miles between potential oil and gas activities and shore areas supporting concentrations of biota. Although many of the identified tracts were deleted at the time of tract selection, several were retained for additional study in the NEPA process. We believe that our original concerns regarding these several tracts are still valid and request they be removed from further consideration for leasing. The tracts in question are:

Seldovia NO 5-2: 273, 317, 361, 405, 625, and 663;
Illiamna NO 5-1: 440, 484, 615, 659, and 703;
Mt. Katmai NO 5-3: 43, 88, 131, 132, 176, 219, 220, 263, 264, 306-308, 350, 351, 479, 480, 522, 523, 565, 566, 607, 651, 695, 737, 738, 781, 825.

We appreciate the opportunity to review the DEIS for Outer Continental Shelf Sale No. 60 and hope these comments will assist the Bureau of Land Management in preparation of the Final Environmental Impact Statement.

Attachment

cc: Esther Wunnicke, Manager, Alaska BLM OCS Office, Anchorage

United States Department of the Interior

ADDRESS ONLY THE DIRECTOR, FISH AND WILDLIFE SERVICE

FISH AND WILDLIFE SERVICE
WASHINGTON, D.C. 20240

FILE COPY

In Reply Refer To:
FWS/OBS

MAR 14 1975

MEMORANDUM

To: Director, Bureau of Land Management
(Attn: 720)

From: Director, U.S. Fish and Wildlife Service /sgd./Lynn A. Greenwalt

Subject: Call for Nominations, Oil and Gas Lease Sale #60, Lower Cook Inlet-Shelikof Strait

The Fish and Wildlife Service offers the following recommendations in response to the subject Call for Nominations.

Biological concerns and possible environmental conflicts with proposed oil and gas leasing in Lower Cook Inlet north of Cape Douglas were discussed at some length in our memo of October 24, 1975, which was prepared in response to the Call for Nominations for sale #CI. In that memo, we identified four highly sensitive biological areas in Lower Cook Inlet: Tuxedni National Wildlife Refuge; the Barren Islands; Kachemak Bay; and Kamishak Bay. We discussed the substantial seabird and marine mammal populations residing there and the valuable commercial fisheries which occur in the area. We recommended that no leasing take place within 12 nautical miles of the Barren Islands nor within 6 nautical miles of other known seabird or marine mammal rookery areas. In order to protect marine fish and shellfish resources and to possibly ameliorate conflicts between commercial fishing activities and oil and gas exploration operations, tracts in marine fishing concentration areas were also recommended for deletion. In all, a total of 94 tracts were recommended for deletion. Five of those tracts were subsequently leased and drilling has occurred on one of them although commercial quantities of hydrocarbons were apparently not encountered.

In the following discussion of tracts to be withdrawn from sale #60, comments concerning those tracts located in Lower Cook Inlet iterated in our memo of October 24, 1975 are still valid. They may even be of greater concern now, in light of the increased commercial fishing interests which have developed in the area during the intervening years.

Rationale for identifying tracts for deletions in Shelikof Strait are based on the same principles used in Lower Cook Inlet. Numerous seabird rookeries and marine mammal concentration areas dot the coastlines of the Alaska Peninsula and Kodiak Island adjacent to the proposed lease area. Commercial fishing operations (salmon, halibut, herring, shrimp, razor clams, and King, Tanner, and Dungeness crab) which occur throughout the Strait are particularly intense in some bays and near certain headlands.

Identifying individual tracts for deletion to protect biological resources is best accomplished with those resources which are specifically located relative to given tracts. Bird colonies and mammal rookeries are well suited for this treatment. Fishing operations or marine fish populations in general are not, since they are much more mobile. In Shelikof Strait, however, and for the most part, Lower Cook Inlet, buffer zones established for bird and mammal rookeries generally overlap the more intense commercial fishing areas or fish concentration sites. Four exceptions to this overlap exist within the area of call. Offshore Kachemak Bay, Katmai Bay, Uyak Bay and Karluk River. In these four instances, the recommendation for buffer zone protection is predicated on the occurrence of fish resource concentrations alone since no major bird or mammal rookeries are located in the immediate vicinity.

In most cases, a six nautical mile buffer zone (including the waters within the State's three mile zone) of no leasing is recommended. Recent studies have indicated that a large percentage of birds from a given colony will be found within that range and marine mammals should be quite dispersed at that distance from their haul out area. While large numbers of bird colonies and marine mammal use areas exist along the shores of Lower Cook Inlet and Shelikof Strait only those containing more than 1,000 birds or an estimated 25 marine mammals were included as sites for buffer protection. To identify sensitive tracts adjacent to a particular location, a six mile diameter arc was drawn around the site on the protraction diagram. Each tract within or touched by the arc thus became a candidate for deletion.

Following the coastline south from Kalgin Island to Wide Bay and north from Cape Ikolik to Anchor Point, the tracts recommended for deletion are:

Protraction Diagram -Location	Resource	Tracts
KENAI NO 5-8		
South Shore Kalgin Island	Seals	669, 670, 713-716, 757-760
Chisik Island	Seabirds	755, 756, 799, 800, 843, 844 887, 888, 931, 932, 974-976
SELDOVIA NO 5-2		
Chisik Island	Seabirds	6, 7
Gull Island-Chinitna Bay	Seals	178, 179, 222, 223, 265, 266
Dry Bay	Seals	309, 353
ILIAMNA NO 5-1		
Dry Bay	Seals	396, 440, 484
Oil Bay	Seals	438, 439, 480-483
Augustine Island	Seals, sea otters	479, 522-526, 566-570, 610, 611, 613-615, 657-659, 701-703, 741-747, 785, 829
Augustine Rocks	Sea lions	786-791, 830-835, 874-878, 919-921
Shaw Island	Seals	962-966, 1006-1010, 1053, 1054
MT. KATMAI NO 5-3		
Cape Douglas	Seals	41-43, 86-88, 130-132, 176
Douglas Reef	Seals	174, 175, 218-220, 262-264 304-308, 349-351
Kuikpalik Island	Seals	347, 348, 391, 392, 434-436, 480
Shakun Rock	Seals	475, 477-479, 519-523, 564-566
Nukshak Island	Sea lions	518, 562, 563, 606, 607, 649-651, 692-695
Cape Ugyak	Sea lions	736-738
Cape Gull	Sea lions	780, 781, 823 825, 867-869

Kuliak Bay	Seals	910, 911
Takli Island	Seals, sea lions	952-954, 994-998
KARLUK NO 5-5		
Takli Island	Seals, sea lions	26-29
Dakovak Bay	Seals	22-25, 67-70
Katmai Bay	Marine fisheries	20, 21, 64-66, 108, 109
Alinchak Bay	Seals	151, 194, 195, 237-239
Puale Bay	Sea lions, sea otters	280-282, 321-325, 365-368
Dry Bay	Seabirds	364, 408, 409, 452, 453, 496
Jute Island	Seals	408, 449-451, 492-495

Cape Igvak	Seals	535-537
Wide Bay	Seals	579, 580, 623, 624, 667
UGASHIK NO 4-6		
Wide Bay	Seals	609, 610, 695-698, 652-654, 739-741
KARLUK NO 5-5		
Cape Ikolik	Seals, sea lions	723-725, 679, 680
Tombstone Rocks	Seals, sea lions	635-637, 591-594
Middle Cape	Seals, sea lions	548-550, 505-507
Karluk River	Salmon	420, 376-378, 333-335
Uyak Bay	Marine fisheries	291-293, 247-250, 204-207, 163, 119

Cape Ugat	Seals, sea lions	164, 120, 121, 76-79, 33-35
Noisy Island	Seals, seabirds	36, 37
MT. KATMAI NO 5-3		
Noisy Island	Seals, seabirds	1004-1007, 961, 962
Raspberry Cape	Seals	917-919, 873-876
Driver Bay	Seals	830-833
Cape Kuniliak	Seals	788, 789, 744-746
Cape Paramanof	Sea lions	702, 703, 658-660, 615, 616
AFOGNAK NO 5-4		
Alligator Island	Seabirds	529, 485, 486, 441-443

Cape Newland to Shag Island	Seals	442, 443, 398, 399, 354-356, 311-313
Latax Rocks	Seals, sea lions	268-270, 272, 224-229, 181-185
Sud Island	Sea lions, seabirds	141-143, 99, 18
Ushagat Island	Seals, sea lions, seabirds	138-140, 94-96, 50, 51, 6, 7
SELDOVIA NO 5-2		
Ushagat Island	Seals, seabirds	1018-1020
West Amatuli Island	Seals, sea lions, seabirds	1024-1026, 979, 980
Nord Island	Seabirds	1021, 1022, 976-978, 933-935

Elizabeth Island	Seals, sea lions	981, 982, 936-938, 891-893, 847-849, 803-805
Flat Island	Sea Lions, seabirds	758-760, 714 715, 670-672, 626-628, 583, 584

The following tracts were identified for deletion in our October 24, 1975 submission in order to provide greater protection for the high quality seabird and marine mammal resources of the Barren Islands and the intense commercial fishieres adjacent to Kachemak Bay. We are again recommending they be deleted for the same reasons. They are:

Afognak NO 5-4	93, 49, 8
Seldovia NO 5-2	1017, 973-975, 930-932, 888-890, 669, 625, 581, 582, 537-540, 493-496, 449-453, 405-409, 361, 363-365, 317, 320, 321, 273, 276, 277

The attached chartlet illustrates the 460 tracts recommended for deletion.

In summary, the Lower Cook Inlet-Shelikof Strait area of Alaska is rich in marine biological resources. It supports some of the most valuable commercial fisheries in the Nation and is the home of some of the most outstanding marine mammal and seabird populations in North America. Tuxedni Bay, the Barren Islands, and both shores of Shelikof Strait are lands of national interest (wildlife refuges or national monuments) within which ecological balances are intimately associated with natural processes in the adjacent marine environment. In order to provide a minimal level of environmental protection from development impacts for these superlative resources, the U.S. Fish and Wildlife Service recommends the following tracts be removed from consideration for oil and gas leasing during sale #60 and any subsequent sales proposed for the area.

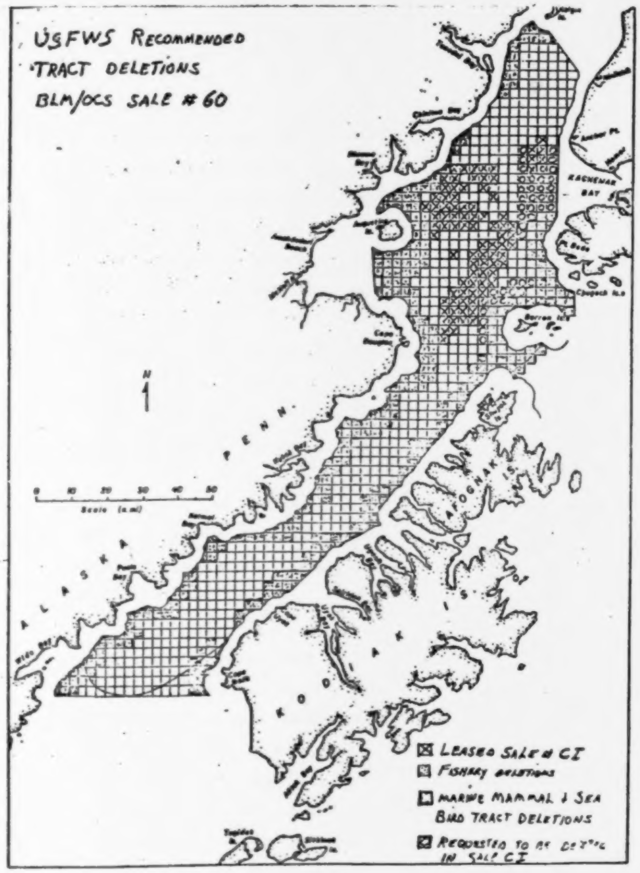
[illegible]	[illegible] 119-121, 151, 163, 194, 195, 204-207, 237-239, 247-250, 280-282, 291-293, 321-325, 333-335, 364-368, 376-378, 408. 409, 420, 449-453, 492-496, 505-507, 535-537, 548-550, 579, 580, 591-594, 623, 624, 635-637, 667, 679, 680, 723-725
Ugashik NO 4-6	609, 610, 652-654, 695-698, 739-741

	[illegible]
Seldovia NO 5-2	6, 7, 178, 179, 222, 223, 265, 266, 273. 276, 277, 309, 317, 320, 321, 353, 361, 363-365, 405-409, 449-453, 493-496, 537-540, 581-584, 625-628, 669-672, 714, 715, 758-760, 803, 805 847-849, 888-893, 930-938, 973-982, 1017-1020, 1024-1026
Iliamna NO 5-1	396, 438-440, 479-484, 522-526, 566-570, 610, 611, 613-615, 657-659, 701-703, 741-747, 785-791, 829-835, 874-878, 919-921, 962-966, 1006-1010, 1053, 1054
Afognak NO 5-4	6-8, 49-51, 93-96, 99, 138-143, 181-185, 224-229, 268-270, 272, 311-313, 354-356, 398, 399, 441-443, 485, 486, 529
Mt. Katmai NO 5-3	41-43, 86-88, 130-132, 174-176, 218-220, 262-264, 304-308, 347-351, 391, 392, 434-436, 475, 477-480, 518-523, 562-566, 606, 607, 615, 616, 649-651, 658-660, 692-695, 702, 703, 736-738, 744-746, 780, 781, 788, 789, 823-825, 830-833, 867-869, 873-876, 910, 911, 917-919, 952-954, 961, 962, 994-998, 1004-1007

Afognak NO 5-4	6-8, 49-51, 93-96, 99, 138-143, 181-185, 224-229, 268-270, 272, 311-313, 354-356, 398, 399, 441-443, 485, 486, 529
Mt. Katmai NO 5-3	41-43, 86-88, 130-132, 174-176, 218-220, 262-264, 304-308, 347-351, 391, 392, 434-436, 475, 477-480, 518-523, 562-566, 606, 607, 615, 616, 649-651, 658-660, 692-695, 702, 703, 736-738, 744-746, 780, 781, 788, 789, 823-825, 830-833, 867-869, 873-876, 910, 911, 917-919, 952-954, 961, 962, 994-998, 1004-1007

Karluk NO 5-5	20-29, 33-37, 64-70, 76-79, 108, 109, 119-121, 151, 163, 194, 195, 204-207, 237-239, 247-250, 280-282, 291-293, 321-325, 333-335, 364-368, 376-378, 408, 409, 420, 449-453, 492-496, 505-507, 535-537, 548-550, 579, 580, 591-594, 623, 624, 635-637, 667. 679, 680, 723-725

Ugashik NO 4-6	609, 610, 652-654, 695-698, 739-741



ALASKA OCS OFFICE
ANCHORAGE, ALASKA

MARINE MAMMAL COMMISSION
1625 EYE STREET, N.W.
WASHINGTON, DC 20006

17 NOV '80

31 October 1980

Ms. Esther Wunnicke
Manager
Alaska OCS Office
Bureau of Land Management
P.O. Box 1159
Anchorage, Alaska 99510

Dear Ms. Wunnicke:

The Commission, in consultation with its Committee of Scientific Advisors on Marine Mammals, has reviewed the "Draft Environmental Impact Statement (DEIS), Lower Cook Inlet-Shelikof Strait, Alaska Outer Continental Shelf Office, Oil and Gas Lease Sale #60" and offers the following comments and recommendations with respect to the possible direct and indirect effects of the proposed action on marine mammals.

GENERAL COMMENTS

The DEIS, with a few exceptions (see below), provides a reasonably thorough and accurate assessment of the possible direct and indirect effects of the proposed action on marine mammals. It concludes, among other things, that activities and events associated with the proposed action are not likely to have significant direct or indirect effects on any endangered species or population of marine mammal, but that they could have significant direct or indirect effects on non-endangered populations of sea otters, harbor seals, sea lions, beluga whales and, perhaps, other marine mammals that occur in or near the proposed lease sale area.

The DEIS does not identify or provide a thorough assessment of the specific measures that would be taken to assure that activities and events associated with the proposed action do not have a significant adverse effect on non-endangered species or populations of marine mammals. Neither does it indicate whether the Bureau of Land Management has consulted, or intends to consult with, the National Marine Fisheries Service and the U.S. Fish and Wildlife Service to determine measures that would be needed to provide the necessary assurances.

SPECIFIC COMMENTS

Page 13, Para. 6

The last sentence in this paragraph notes that the U.S. Fish and Wildlife Service (FWS) is responsible for the protection of certain species covered under the Endangered Species Act of 1973. It also should note that the FWS is responsible for the protection of certain species covered under the Marine Mammal Protection Act of 1972.

Pages 34-35 (Potential Mitigating Measure No. 5)

The DEIS notes (Page 28) that several potential mitigating measures were identified during the preparation of the DEIS and that, while these potential measures are described in the DEIS, they are not part of the proposal and were not considered in the environmental impact assessment since acceptance has not yet occurred. Potential Mitigating Measure No. 5 (Protection of Biological Resources) would provide a mechanism for protecting marine mammals and other biota in Cook Inlet, and should be adopted. Since the U.S. Fish and Wildlife Service and the National Marine Fisheries Service are responsible, under the authority of the Marine Mammal Protection Act, for the protection of marine mammals and their habitats, the mitigating measure should be revised to require that the DCM (Deputy Conservation Manager, Field Operations, Alaska Region, USGS) consult with respresentatives of the NMFS and/or the FWS, as appropriate, to determine whether marine mammal populations or habitats requiring additional protection exist within the lease area and, if so, what additional measures might be needed to protect these populations or habitats.

Pages 35-36, Information on Bird and Mammal Protection

This section of the DEIS indicates that bidders will be advised that: lessees and their agents, contractors, and subcontractors will be subject to the provisions of the Marine Mammal Protection Act, the Endangered Species Act, and unspecified international treaties; although disturbance of sea birds and marine mammals would be unlikely if ocean vessels and aircraft maintained at least a 1-mile distance from sea bird colonies and marine mammal rookeries, it is impossible to accurately predict how, and at what distances, birds and marine mammals might be affected by vessel and aircraft activities; and, in the event that vessel and aircraft activities may disturb protected wildlife at distances greater than 1-mile, lessees and their contractors should be aware that such disturbance could be determined to constitute harassment, and thereby be in violation of existing Federal laws (e.g., the Marine Mammal Protection Act and the Endangered Species Act). From the information provided, it is not clear whether the notice is intended to: (1) provide general

guidelines for the operation of vessels and aircraft in the vicinity of sea bird colonies and marine mammal rookeries; (2) stipulate that no vessel or aircraft activity will be permitted within 1 mile of sea bird colonies or marine mammal rookeries; or (3) advise lessees that they may be cited for violations of the Marine Mammal Protection Act or the Endangered Species Act even though they may be complying with guidelines or stipulations concerning the operation of vessels or aircraft in the vicinity of sea bird colonies or marine mammal rookeries.

If the notice is intended to provide general guidelines for the operation of vessels and aircraft in the vicinity of sea bird colonies and marine mammal rookeries, it should be recognized that they may not be enforceable. Therefore, if it has not already done so, the Bureau should consult with the National Marine Fisheries Service and the U.S. Fish and Wildlife Service to determine whether the proposed guidelines or stipulations are sufficient and enforceable. If, as the DEIS suggests, available information is insufficient to determine the precise measures that are needed to prevent or mitigate disturbance from vessel or aircraft operations, the proposed action should be modified to include: a program to evaluate the adequacy of the proposed measures; and provision for modifying those measures if they prove inadequate.

Pages 41-42 (Alternative III - Delay the Sale)

This section notes, among other things, that delaying the sale would provide additional time and opportunity "to fill biological data gaps, existing especially in the Shelikof Shelf area, for finfish and shellfish populations, marine mammals and cetaceans, marine and coastal birds, and vulnerable coastal habitats". It also should note that additional time would provide the opportunity to assess the possible need for, and utility of, additional mitigating measures.

Page 181, Sentence 1

This sentence states that: "Existing legislative contraints and permitting procedures may serve to minimize localized impacts" (emphasis added). A determination should be made as to whether existing legislative contraints and permitting procedures would or would not serve to minimize localized impacts; the results of this determination should be reported in the FEIS.

Page 181, Paragraph 1

This paragraph indicates that, if exploratory and production drilling are permitted in the proposed lease sale area, there would be a significant probability that areas inhabited by sea lions would be contacted by spilled oil. It then concludes that "direct effects of spilled oil on major concentrations of sea lions seem relatively unlikely as a result of the proposal".

Although it may be true, for reasons not noted, that oil contamination would have little direct effect on sea lions, the paragraph presents and discusses information concerning the probability of contact with spilled oil and it would seem that the aforementioned conclusion should be rephrased to read something like: "Therefore, it seems likely that major concentrations of sea lions would be contacted by spilled oil as a result of the proposal."

Page 184, Paragraph 1

This paragraph indicates, among other things, that cumulative or chronic oil spills could affect the behavior or physiological condition of harbor seals or sea lions, causing a decrease in reproductive success. Chronic disturbance from aircraft or vessel operations could have the same effect and it should be so noted in paragraph 1 on Page 185.

Pages 185-186 (Direct and Indirect Effects of Oil and Gas Pollution)

This section of the DEIS presents and discusses available information concerning the possible direct and indirect effects of oil on cetaceans. It does not note that the Bureau's New York OCS Office is supporting a study to assess the possible direct effects of oil on cetaceans. Data from this study may eliminate some of the uncertainties concerning the possible effects of oil and the study should be identified and described in the FEIS.

Page 186, Paragraph 2

This paragraph notes, among other things, that: "Of the non-endangered cetaceans, it is most likely that Dall and harbor porpoise could also be affected." Subsequent discussions in the DEIS (e.g., paragraph 1 on Page 189) suggest that beluga whales also could be affected by the proposal. Therefore, it would seem that the aforementioned statement should read: "Of the non-endangered cetaceans, it is most likely that Dall's porpoise, harbor porpoise, and beluga whales also could be affected."

Pages 187-189 (Effects of Noise and Disturbance)

This section of the DEIS presents and discusses information concerning the possible effects of noise and disturbance on cetaceans. It does not note that the Bureau's New York and Alaska OCS Offices currently are supporting studies to determine how OCS-related noise might affect the behavior, movements, and habitat-use patterns of certain cetaceans. Data from these studies may eliminate some of the uncertainties concerning the possible effects of noise and the studies should be identified and discussed in the FEIS.

Page 189, Paragraph 3

The first sentence in this paragraph states that: "Indirect effects of exploration, development, and production phases of the proposed sale would be a major concern if it were known that a large or critical portion of an endangered population frequented the proposed #60 area." The summary of available information on non-endangered cetaceans, on the back of Graphic 12, indicates that approximately 500 beluga whales occur in Cook Inlet and that "There is some evidence that the Cook Inlet population is taxonomically distinct from other populations ..." . It would seem, therefore, that the FEIS should include a more complete assessment of the possible effects of the proposed action on the Cook Inlet population of beluga whales.

CONCLUSIONS AND RECOMMENDATIONS

Although the DEIS concludes that activities and events associated with the proposed action could have significant direct and indirect effects on populations of sea otters, harbor seals, sea lions, beluga whales and, perhaps, other marine mammals that inhabit the proposed lease sale area, it does not identify or evaluate the adequacy of specific measures that would be taken to prevent or mitigate possible adverse effects on these non-endangered populations. Additionally, while the DEIS indicates that the Bureau of Land Management consulted with the National Marine Fisheries Service, pursuant to Section 7 of the Endangered Species Act, to determine whether the proposed action might have a significant adverse effect on endangered cetaceans, it does not indicate whether the Bureau consulted with the National Marine Fisheries Service and the U.S. Fish and Wildlife Service to determine whether the proposed action could have a significant adverse effect on non-endangered species of marine mammals and, if so, what mitigating measures and/or monitoring programs may be needed to provide the necessary assurance that the proposed action would not be contrary to the intents and provisions of the Marine Mammal Protection Act.

The National Marine Fisheries Service and the U.S. Fish and Wildlife Service are responsible, under the authority of the Marine Mammal Protection Act, for the protection of the marine mammal species and populations that could be affected directly or indirectly by the proposed action and, for the reasons noted, the Commission recommends that the Bureau of Land Management consult with the NMFS and the FWS, if it has not already done so, to determine the precise measures and monitoring program(s) that would be needed to provide the necessary assurance that the proposed action would not be contrary to the intents and provisions of the Marine Mammal Protection Act.

If you or your staff have any questions concerning these comments or recommendations, Dr. Hofman, the Commission's Scientific Program Director, or I would be please to discuss them with you.

Sincerely,

John R. Twiss, Jr.
Executive Director

cc: Mr. Lynn A. Greenwalt
Mr. Frank Gregg
Mr. Terry L. Leitzell

UNITED STATES DEPARTMENT OF COMMERCE
The Assistant Secretary for Policy
Washington, D.C. 20230

OCT 27 1980

Ms. Esther C. Wunnicke
Manager, Alaska OCS Office
Bureau of Land Management
Department of the Interior
P.O. Box 1159
Anchorage, Alaska 99510

Dear Ms. Wunnicke:

This is in reference to your draft environmental impact statement entitled, "Proposed Outer Continental Shelf Oil and Gas Lease Sale, Lower Cook Inlet/Shelikof Strait." The enclosed comments from the National Oceanic and Atmospheric Administration and the Maritime Administration are forwarded for your consideration.

Thank you for giving us an opportunity to provide these comments, which we hope will be of assistance to you. We would appreciate receiving twelve copies of the final statement.

Sincerely,

Robert T. Miki
Deputy Assistant Secretary for
Regulatory Policy (Acting)

Enclosures: Memos from Kenneth W. Forbes
Office of Shipbuilding Costs
Maritime Administration

Michael Glazer
Office of Coastal Zone Management
National Oceanic and
Atmospheric Administration

cc: Director (540)
Bureau of Land Management
Washington, D.C.

Mgr.
Asst. Mgr.
Sr. Staff Ldr.
Sr. Staff Ldr.
PIO
Chief, O
Chief, CA
Chief, MS
Supv. CA
A Action
I Info

UNITED STATES DEPARTMENT OF COMMERCE
Maritime Administration
Washington, D.C. 20230

September 23, 1980

MEMORANDUM FOR: Bruce R. Barrett
Office of Regulatory Policy
Department of Commerce

Subject: Draft Environmental Impact Statement - Proposed Outer Continental Shelf Oil and Gas Lease Sale Lower Cook Inlet/Shelikof Strait (OCS Sale No. 60) (CN 8008.20)

In accordance with your memorandum of August 20, 1980, the Maritime Administration has reviewed the subject draft environmental impact statement (DEIS) and submits the following comments for your review and consideration.

Federal Regulatory Responsibilities, pg. 14

Discussion:

It is stated that under the Federal Water Pollution Control Act, the Coast Guard approves the procedures to be followed and the equipment used for the transfer of oil from vessel to vessel and between onshore and offshore facilities and vessels.

Comment:

It should be noted that subsection (17) of Section 5 of the Port and Tanker Safety Act requires the Secretary of the department in which the Coast Guard is operating to develop regulations for safety and protection of the marine environment for vessel to vessel transfers of oil cargoes in United States navigable waters and the marine environment.

Potential Mitigating Measure No. 2 - Transportation of Hydrocarbon Products, pg. 30

Discussion:

It is stated that where surface transportation must be employed, all vessels used for carrying hydrocarbons to shore from leased areas will conform with all standards established for such vessels, pursuant to the Ports and Waterways Safety Act of 1972.

Comment:

The Port and Tanker Safety Act of 1978, which amends the Ports and Waterways Safety Act, contains standards which tank vessels must meet. Subsection (7)(m) of Section 5 will require a crude oil tanker which is engaged in the transfer of oil from an offshore exploitation or production facility on the Outer Continental Shelf of the United States, not later than June 1, 1980, be equipped with segregated ballast tanks or may operate with dedicated clean ballast arrangements. The Coast Guard published in the Federal Register of May 1, 1980, a notice of proposed rulemaking implementing this section of the Act. The DEIS should reflect these requirements.

Kenneth W. Forbes
KENNETH W. FORBES
Chief, Division of Environmental Activities
Office of Shipbuilding Costs

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
OFFICE OF COASTAL ZONE MANAGEMENT
Washington, D.C. 20235

Rec'd PP/EC
OCT 17 1980

CZ/RC:GK

OCT 17 1980

TO: PP/EC - Joyce Wood

FROM: CZ - Michael Glaze

SUBJECT: NOAA Comments on the Draft Environmental Impact Statement for OCS Lease Sale No. 60 - Lower Cook Inlet - Shelikof Strait

This memorandum and its attachments provide the comments of the National Oceanic and Atmospheric Administration (NOAA) on the draft environmental impact statement (DEIS) prepared by the Bureau of Land Management (BLM) for Outer Continental Shelf Lease Sale No. 60 in the Lower Cook Inlet and Shelikof Strait.

Characterization of the Affected Environment

The proposed sale will impact an extremely productive commercial, recreational, and subsistence fishing area as well as an important marine mammal habitat and migratory pathway. The following principal natural regions may be affected by activities resulting from the sale:

Kachemak Bay: The entry of clear, nutrient-rich waters from the Gulf of Alaska, a wide variety of habitats and relatively mild winters give the bay probably the greatest assortment of biological resources of the entire Lower Cook Inlet. An important commercial and recreational fishing and shellfishing area, Kachemak Bay has been designated a "critical habitat" by the State of Alaska. The islets and wetlands along the southern shore of the outer bay would suffer long-term impacts from an oil spill. They are also an important subsistence use area.

Kennedy Entrance/Barren Islands: Next in productivity to Kachemak Bay in Lower Cook Inlet, this region supports the largest concentrations of colonial marine birds, sea lions, harbor seals, and sea otters in the lower part of the inlet. It serves as the principal pathway for the Gulf of Alaska waters that contribute to Kachemak Bay's high productivity and for salmon moving between Cook Inlet and the Gulf of Alaska. It is also an important subsistence use area.

Lower Central Region: This region provides the major commercial harvest area for Tanner and king crab in Lower Cook Inlet. It also includes all the tracts from the October 1977 federal lease sale. It is characterized by a relatively flat bottom with [illegible] waves in the central portion, highly variable, tide-dominated [illegible], and considerable turbidity.

Kamishak Bay: With turbid waters and severe winters, this region has much lower biological productivity and diversity than Kachemak Bay. It is, nonetheless, a major spawning and harvest area for Tanner and king crab and herring as well as a staging area for waterfowl and shorebirds during spring migration. Portions of its shore and wetland areas would suffer long-term impacts from an oil spill.

Kalgin Island Region: Turbidity and rapid, tide-dominated currents that scour the bottom and ice scouring of the shoreline contribute to a relatively low primary productivity in this region. However, it includes the most important salmon gillnet fishery in Lower Cook Inlet. Its shoreline contains the largest concentration of razor clams in the lower inlet, as well as important habitat for migrating waterfowl and shorebirds, particularly Tuxedni Bay National Wildlife Refuge, which would suffer long-term impacts from an oil spill.

Shelikof Strait: Physically and, to some extent, biologically different than Lower Cook Inlet, the Strait is a highly productive commercial fishing area. The many deep bays on the western shore of Kodiak Island and similar habitat along the Alaskan Peninsula provide spawning and nursery areas for the same commercial species found in Lower Cook Inlet, but the harvest area in Shelikof Strait is much larger. The Kodiak shore is also an important subsistence area. Portions of the shoreline on both sides of the Strait, which include two national monuments, two national wildlife refuges, and a national forest, would suffer long-term impacts from an oil spill.

In our view, the DEIS could have been substantially improved by the inclusion of an analytical description of the natural regions likely to be impacted that would have provided a clearer picture of their relative productivity and sensitivity. Similarly, the discussions of the species at risk would have been more useful if the local populations identified as likely to be impacted by activities under the lease sale were related to the total Alaskan population of those species. What, for example, is the significance of the sea lion and harbor seal populations discussed in the impact analysis on pages 181-182 of the DEIS to the Alaskan populations? That significance is extremely important to an evaluation of the severity of the likely impacts. The description of the affected environment on the back of the graphics (an awkward format that we suggest be avoided in the future) is too detailed and too fragmented to provide a useful perspective from which to evaluate the proposed alternatives and mitigating measures.

Alternative V Recommended

The oil spill trajectory analysis in the DEIS indicates that Shelikof Strait (particularly the Kodiak shore) and Kamishak Bay would face the highest risk of impact from an oil spill under proposed Lease Sale No. 60. When this sale is considered with the first federal lease sale in Lower Cook Inlet and possible tanker routes, additional high risk areas are identified at Anchor Point at the northern entrance of Kachemak Bay and at the Barren Islands. Kachemak Bay itself is shown as a low risk area.

Deletion of tracts proposed under Lease Sale No. 60 for Lower Cook Inlet (Alternative VI) does not significantly alter these risks, given the possibility of oil and gas operations from the earlier federal sale. But deletion of tracts proposed for the Shelikof Strait (Alternatives IV and V) reduces the percentage risk an of oil spill impacting the shoreline within ten days from 94 percent (under the proposed lease sale, Alternative I) to 69 percent (Alternative IV) or 59 percent (Alternative V). In view of the significant additional protection provided to marine living resources under Alternative V, particularly in the important Shelikof Strait area, NOAA recommends that it be adopted by the Department of the Interior (DOI).

If Alternative I or VI is adopted, NOAA recommends that tracts nearest the Alaskan Peninsula shore of Shelikof Strait (nos. 43, 131, 219, 263, 3[illegible], 307, 350, 479, 522, 565, 607, 608, 651, 695, 737, 738, 781, 782 and 825 on the Mount Katmai No. 5-3 protraction diagram) and one tract in the northeast section of the Strait (no. 309 on the Afognak No. 5-4 protraction diagram) be deleted to provide greater protection for marine resources and coastal habitat.

Mitigating Measures

NOAA recommends that the following "potential mitigating measures" discussed in the DEIS (pages 29-37) be formally adopted as written for proposed Lease Sale No. 60:

No. 1 - Well and Pipeline Requirements - to minimize loss of fishing gear;

No. 2 - Transportation of Hydrocarbon Products - to protect pipelines and provide for the transportation of hydrocarbons by the safest and environmentally preferable method;

No. 3 - Environmental Training Program - to make workers aware of environmental, social and cultural values of the area; and

No. 5 - Protection of Biological Resources - to protect biological populations and habitat.

Regulation of Offshore Drilling Discharges

While recognizing the need to avoid duplicatory regulation of the disposal of drilling muds, cuttings and formation waters, NOAA is concerned about two aspects of the arguments presented on pages 33-34 against the adoption of a stipulation for this purpose. We understand that the Environmental Protection Agency (EPA) regional personnel responsible for issuing NPDES permits for OCS operations off Alaska have recently been issuing "letters of permission" based on voluntary compliance with specified standards in lieu of an NPDES permit. These informal procedures were presumably only temporary while the guidelines for the issuance of NPDES permits under Section 403(c) of the Clean Water Act were being prepared. Final guidelines for ocean discharge criteria were issued by EPA October 3, 1980. EPA should now be able to

return to the formal procedures that provide the opportunity for federal, state, and local review and comment cited in the DEIS. We also note that standard discharge rates and levels for effluents have been established for Lower Cook Inlet but not, apparently, for Shelikof Strait. The significance of this apparent gap should be addressed in the FEIS.

Information to Lessees on Bird and Mammal Protection

NOAA strongly supports the inclusion of an Information to Lessees item on wildlife protection, and, after consultation with the U.S. Fish and Wildlife Service, recommends that the text of the proposed information item given on pages 35-36 of the DEIS be re-drafted as indicated in Attachment I.

The new text more closely approximates the provisions of the relevant acts and treaties and will be more informative to lessees. This material should also serve as a guideline for that portion of the environmental training program required under mitigating measure no. 3 that deals with harassment of wildlife resources. It is obviously important that the operators of aircraft and boats servicing offshore rigs be well briefed on local wildlife resources requiring such protection.

Oil Spill Response Inadequately Addressed

Although the DEIS contains a four-page discussion of oil spill response and an appendix giving a detailed inventory of clean-up equipment already in the general area, it does not address the one issue that is most critical to OCS operations in nearshore areas, i.e., the time needed by an operator to respond to an oil spill. Nor does it propose and evaluate any mitigating measures intended to reduce response time to a minimum. In correcting this deficiency in the FEIS, BLM should indicate the spill equipment deployment time likely to be prescribed in the oil spill contingency plan and what percentage of a given season may have wind, wave, current and possibly ice conditions that are too severe for effective deployment of containment and clean-up equipment.

If such an evaluation reveals that little or no protection can be afforded areas with significant living marine resources during particularly vulnerable stages of their life cycle, then the possibility of additional mitigating measures for the tracts placing those resources at greatest risk should be considered in the FEIS.

Cumulative Impacts

The combination of Proposed Lease Sales Nos. 60 and 61 (the new sale scheduled east of Kodiak following the cancellation of Lease Sale No. 46) may have a significant impact on Kodiak's important fishing industry, but the DEIS (on page 150) states that, because resource estimates and the proposed sale area are not now known for Lease Sale No. 61, the cumulative impacts of these two sales cannot be addressed until the DEIS is prepared on Sale No. 61. However, that will be too late to affect leasing decisions under Sale No. 60. We believe BLM should have attempted to evaluate the potential cumulative impact on Kodiak from these two sales, drawing on data already available in the DEIS prepared for the now cancelled Lease Sale No. 46. Since the Shelikof Strait portion of proposed Lease Sale no. 60 will probably have the greatest

impact on the Kodiak fishing industry, deletion of these tracts under Alternative V would provide the added advantage of enabling BLM to assess and mitigate the cumulative impacts before leasing this important area.

BLM should also consider possible cummulative impacts from lease sales that may be held in state waters at approximately the same time as Lease Sale No. 60.

New Data on Shelikof Straits

Because the Shelikof Strait area was added to the proposed Lease Sale No. 60 area rather recently, some of the more significant environmental studies have only now been completed, too late to be referenced in the DEIS. We recommend that the FEIS incorporate data from the Research Planning Institute's (RPI) 1980 study of the coastal vulnerability of the Alaska Peninsula side of the Strait and the U.S. Geological Survey's (USGS) 1980 reconnaissance survey of seafloor hazards. RPI's earlier work on the Kodiak shore indicated that the deeply indented coast will act as an "oil trap" with floating oil tending to move deeper into the fjords rather than moving out. The USGS preliminary data show major faults within the Shelikof Strait tracts with surface scarps up to 100 meters high, indicative of probable active movement. While there is little evidence of sediment instability, the sediments are soft and sandy muds which may fail under loading if platform foundations are not properly designed. Moreover, seismic profiles show acoustic anomalies which may be related to gas charging in the sediments. Reconnaissance surveys of volcanic hazards that may affect the Shelikof Strait lease area will not be completed in time for inclusion in the FEIS, but will need to be considered before final leasing decisions are taken.

Coastal Management Impacts

The DEIS (on page 15) correctly cites the federal consistency requirements of Section 307(c)(1) of the Coastal Zone Management Act, including its application to pre-lease activities. However, the DEIS does not adequately describe the relationship between the Alaska Coastal Management Program (ACMP) and the proposed lease sale. The FEIS should fully portray the state and borough positions relative to federal consistency with pre-lease activities.

The boroughs, as part of their development of district coastal management programs under the ACMP, are in the process of identifying areas where they do not want impacts associated with oil and gas lease sales to occur or physical activity to take place. The DEIS, on page 228, notes one such area when it discusses the potential conflict between the Kodiak Island Borough's planning goals and objectives and the possible location of a marine terminal at Talnik Point. Any other areas that may be identified by the boroughs where they do not want oil and gas related activities to occur should be fully discussed in the FEIS. This information will ultimately have a bearing on the consistency of pre-lease activities with the ACMP.

NOAA's Statutory Responsibilities

The statement on the responsibilities of NOAA at the bottom of page 14 of the DEIS is too narrow. The phrase "protection of marine fisheries resources" fails to include NOAA's responsibilities for the conservation and management of marine mammals and the protection of marine endangered species. It should therefore be deleted and the phrase "conservation and management of marine living resources" inserted in its place, followed by the phrase "...and their habitats." The remainder of the sentence should be deleted as NOAA's OCS role is not limited to providing recommendations to the Corps of Engineers.

The listing of NOAA's statutory authorities in the last paragraph on page 14 should be expanded to include the Fish and Wildlife Coordination Act of 1958, Title III as well as Title II of the Marine Protection, Research and Sanctuaries Act of 1972 (the reference to "comprehensive research on Ocean Dumping" should accordingly be deleted), the Coastal Zone Management Act of 1972, Section 20(f) (Environmental Studies) and Title IV (Fishermen's Contingency Fund) of the Outer Continental Shelf Lands Act Amendments of 1978, and the Clean Water Act Amendments of 1977 (scientific support coordination for the National Oil and Hazardous Substances Pollution Contingency Plan). The paragraph should begin with the phrase "NOAA's responsibilities" rather than "The Department's responsibilities."

Attachments II through V provide page-specific comments on the DEIS by the NOAA components identified in each heading. They and the discussion in this letter are intended to assist BLM and DOI in strengthening the measures proposed in the DEIS for the protection of marine living resources likely to be affected by Lease Sale No. 60.

Attachments:

I - Draft Information to Lessees on Bird and Mammal Protection
II - National Marine Fisheries Service Comments
III - Outer Continental Shelf Environmental Assessment Program Comments
IV - Pacific Marine Environmental Laboratory Comments
V - Office of Oceanic and Atmospheric Services Comments

ATTACHMENT I

DRAFT ENVIRONMENTAL IMPACT STATEMENT
PROPOSED LEASE SALE 60
LOWER COOK INLET - SHELIKOF STRAIT
PROPOSED REVISION OF INFORMATION ON BIRD AND MAMMAL PROTECTION

Information on Bird and Mammal Protection: Bidders are advised that during the conduct of all activities related to leases issued as a result of this lease sale, the lessee and its agents, contractors and subcontractors will be subject to the provisions of the Marine Mammal Protection Act of 1972, the Endangered Species Act of 1973, as amended, and applicable international treaties.

Those Acts prohibit harassment of marine mammals or endangered and threatened species whether the harassment occurs through an intentional or negligent act or omission. Harassment refers to conduct or activities which disrupt an animal's normal behavior or cause a significant change in the activity of the affected animal. In many cases the effect of harassment is readily detectible: a whale may rapidly dive or flee from an intruder; seals may abandon a rookery and dive into the water; or birds may spontaneously take wing in great numbers to avoid the source of disturbance. Other instances of harassment may be less noticeable to an observer but will still have a significant effect on wildlife.

Leaseholders must be prepared to take all reasonably prudent and necessary measures to avoid harassing or unnecessarily disturbing wildlife. In this regard, leaseholders should be particularly alert to the effects of boat and airplane or helicopter traffic on wildlife.

In order to insure that leaseholders may derive maximum benefits from their operations at a minimum cost to the health and well being of wildlife,

the following guidelines are offered to help avoid potential harassment of wildlife:

(1) (a) Vessels and aircraft should avoid wildlife concentration areas, such as bird colonies or marine mammal rookeries. Operators should, at all times, conduct their activities at a maximum distance from such wildlife concentration areas. Under no circumstances, other than an emergency, should aircraft be operated at an altitude lower than 1000 feet when within 500 lateral yards of rookeries, bird colonies, or groups of whales. Helicopters may not hover or circle above such areas or within 500 lateral yards of such areas.

(b) When weather conditions do not allow a 1000-foot flying altitude, such as during severe storms or when cloud cover is low, aircraft may be operated below the 1000-foot altitude stipulated above. However, when aircraft are operated at altitudes below 1000 feet because of weather conditions, the operator must avoid known wildlife concentration areas and should take precautions to avoid flying directly over, or within 500 yards of rookeries, bird colonies, or groups of whales.

(2) When a vessel is operated near a concentration of whales or other marine mammals the operator must take every precaution to avoid harassment of these animals. Therefore, vessels should reduce speed when within 300 yards of whales or marine mammals and those vessels capable of steering around such groups should do so. Vessels may not be operated in such a way as to separate members of a group of whales or marine mammals from other members of the group.

(3) Vessel operators should avoid multiple changes in direction and

speed when within 300 yards of wildlife. In addition, operators should check the waters immediately adjacent to a vessel to insure that no marine mammals will be injured when the vessel's propellors [or screws] are engaged.

(4) Small boats should not be operated at such a speed as to make collisions with whales or other marine mammals likely. When weather conditions require, such as when visibility drops, vessels should adjust speed accordingly to avoid the likelihood of injury to whales or other marine mammals. Small boats may not be driven into or through an area of water upon which large numbers of migratory sea birds and waterfowl are feeding or resting.

When any leaseholder becomes aware of the potentially harassing effects of lease operations on wildlife, or when any leaseholder is unsure of the best course of action to avoid harassment of wildlife, every measure to avoid further harassment should be taken until the DCM is consulted for instructions or directions. However, human safety will take precedence at all times over the guidelines and distances recommended herein for avoidance of disturbance and harassment of wildlife.

Leaseholders are advised that harassment of wildlife may be reported to the U.S. Fish and Wildlife Service or the National Marine Fisheries Service for further action, including prosecution, under the Marine Mammal Protection Act of 1972 and the Endangered Species Act of 1973.

/ TCHMENT II

Comments on the Draft Environmental Impact Statement
for Lower Cook Inlet-Shelikof Strait, Lease Sale #60
National Marine Fisheries Service
National Oceanic and Atmospheric Administration

The following comments have been received from the Alaskan Regional Office and are forwarded to you for transmittal to the Bureau of Land Management.

GENERAL COMMENTS

The text is generally well written although there appears to be a definite trend to play down potential impacts as a result of the proposal. In numerous instances following the discussion of potential impacts, a flat statement of no impact is made. We question how such a definite statement of no impact can be made when considering (in some cases) the lack of information available and the numerous variables that come into play.

We also note that the statement does not adequately address the impacts to fish and wildlife resources as a result of an increase in the human population. For example, construction of a support or a terminal facility would result in an increase in the number of humans in the area which, in turn, would result in an increase in the number of impacts to fish and wildlife resources from sport hunting and fishing and housing developments.

SPECIFIC COMMENTS

Section II, Alternatives

We believe that Alternative V provides more protection to biological resources in the area than the other alternatives. Under Alternative III (Delay of Sale) the statement mentions that the delay would "provide the opportunity to fill biological data gaps, existing especially in the Shelikof Strait area, for finfish and shellfish populations, marine mammals, marine and coastal birds, and vulnerable coastal habitats." This opportunity would also be provided under Alternative V which would eliminate the portion of the sale in Shelikof Strait. We believe the impacts associated with the proposal and with Alternative VI cannot be accurately identified until all existing data gaps have been filled. Therefore, we see no reason to subject this biologically valuable area (Shelikof Strait) to the risks associated with offshore oil and gas exploration and development at this time.

In the March 16, 1979, letter from Robert W. Knecht to Mr. Gregg, the National Oceanic and Atmospheric Administration provided comments and recommended block deletions for the Cook Inlet/Shelikof Strait Sale No. 60. It should be noted that the proposal (Alternative 1) includes a number of blocks in Shelikof Strait that were recommended for deletion in that letter. It is again recommended that these blocks be deleted from the proposed sale if the decision is made to proceed with Alternatives I, III, or VI. The blocks that are recommended for deletion are as follows:

Mount Katmai No. 5-3: Blocks 43, 131, 219, 263, 306-307, 350, 479, 522, 565, 607-608, 651, 695, 737-738, 781-782, 825.

Afognak No. 5-4: Block 309

Section II, B.I.F., Summary of Probable Impacts, page 38

The statement is made that "the proposed sale would have little or no effect on the Kodiak, Homer, Port Lions, Seldovia, and Kenai commercial fisheries as a whole." This statement is repeated on page 170. However, there are numerous references throughout the DEIS which tend to contradict this statement. These references (page 38, paragraph 2; page 157, paragraph 5; page 158, paragraph 8; page 159, paragraph 4; page 161, paragraph 5; page 163, paragraphs 5 and 8; page 165, paragraphs 3 and 5; and page 167, paragraph 3) generally indicate a potential for decline of various fisheries stocks in the event of an oilspill or as the result of other pollutants. It has been stated that there is a likelihood for four major oilspills as a result of the proposed sale which results in a 94 percent chance of an oilspill impacting coastal habitats due to the relatively close shoreline surrounding the lease area. In addition to the potential for impacts to living resources as a result of various pollutants there is a loss of areas to commercial fishing due to rig placement and conflicting use of vessel fairways. We fail to see how the proposed sale would have little or no effect on commercial fishing activities.

Section IV, A.I.h., Other Major Projects Considered in Analyzing Cumulative Effects. page 150

An evaluation of cumulative effects in regard to lease Sale 61 was not included in this DEIS. The rationale for not including this evaluation was that resource estimates for Sale 61 are unknown at this time, areas of particular interest to industry, government and special interest groups are unknown, and the area selected for further study (the proposal) is unknown. Based on these unknowns, BLM has concluded that no viable assessment of the interrelationship of the sales is possible at this time. We question why the resource assessments and assumptions made for Sale 46 would not be valid to use as a basis for evaluating cumulative effects of the two sales. While the area of call for Sale 61 may differ from that of Sale 46, it is likely that much of the information available from the Sale 46 DEIS would be germane to Sale 61.

Graphic No. 2

This graphic indicates important razor clam beds surrounding the Homer Spit area. According to Figure E.7.1:, page 162 of the Lower Cook Inlet Interim Synthesis Report, razor clams are located only on seaward side of the spit. Additionally, there are other razor clam beds indicated in the report that have not been included in this graphic. It should also be noted that other species of clams are found in the area and are heavily utilized by sport fishermen. These resources have been omitted from this graphic.

Graphic No. 11

A comparison of this graphic and graphic No. 5 from the Kodiak (Sale No. 46) DEIS indicates differences in the location of concentrations of harbor seals,

sea lions and sea otters. Figure 5.98, page 246, of the Kodiak Interim Synthesis Report also indicates minor differences on sea otter concentrations when compared to this graphic.

Graphic No. 12

The entire area of Cook Inlet has been colored orange but the legend fails to identify what this color designates. We assume that it was intended to identify the occurrence of beluga whales. Additionally, it should be noted that Figure 5.85, page 229; Figure 5.86, page 230; and Figure 5.87, page 231 of the Kodiak Interim Synthesis Report indicates additional gray, fin and minke whale sightings that have not been included in this graphic.

ATTACHMENT III

Comments on the Draft Environmental Impact Statement
for Lower Cook Inlet-Shelikof Strait, Lease Sale #60
Office of Marine Pollution Asessment/Outer Continental Shelf Environmental Assessment Program
National Oceanic and Atmospheric Administration

No attempt was made to assess the relative merits of the various development alternatives presented in the DEIS. The document was evaluated primarily with respect to: 1) adequacy of characterization of the regional environment; 2) technical accuracy of the scientific information presented; 3) completeness of information; and 4) organization and interdisciplinary integration of the information. We feel this approach is consistent with OCSEAP's role in the OCS leasing process, which is to work cooperatively with BLM in the acquisition of environmental data that serves as input to DEIS and the other decision documents that influence lease sales.

The paragraphs that follow summarize the more important comments and criticisms of several reviewers and are presented in the context of major subject areas. (The detailed comments are attached to this memo.)

A. Issue: Transport and fate of contaminants

The distillation of relevant information on circulation and meteorology presented in the graphics appears to have been characterized by the loss or obscuring of much pertinent information. It should be the other way around to enable a lay reader quickly to acquire a basic understanding of the environment. (See examples in the detailed comments) A further impediment to comprehension is the mislocation of sentences and paragraphs in the text accompanying the graphics.

The description of circulation fails to account for the extreme variability of currents. The reader should not be led to believe that net currents are either persistent or strong. Much of the transport of material takes place through horizontal movement due to tidal currents.

A crucial part of the risk analysis presented in the DEIS volume was wind patterns and their statistics. A graphic illustrating these patterns would convey more than words do and have more impact.

There should be a discussion of the data that form the basis for the trajectory calculations (wind statistics, net currents, treatment of tides, etc.). This would enhance the plausibility of the risk assessment. Further, it would be useful to discuss coastline vulnerability and to explain why a land segment with no probability of impact can be sandwiched between two that have "low" probability. With regard to the former, the Research Planning Institute's 1980 oil spill vulnerability results should appear in the FEIS.

B. Issue: Geological Hazards.

The development scenario for gas production (on page 24) assumes pipelines from both Shelikof Strait and Lower Cook Inlet to Anchor Point. A direct route for the former would cross the sand wave field in Lower Cook Inlet where some sand waves reach 12 meter heights. The hazards along this pipeline route are not specifically discussed in the DEIS or are mitigating measures and alternative pipeline routes.

Alternative III does not consider impacts of delaying the sale in the contexts of national energy needs and technology. For example, might the costs of development and production increase over a two-year delay to make the lease area economically less attractive, or might technoglocial advances during the period offset the economic disadvantage and possibly reduce the likelihood of environmental impacts?

The lack of geologic information displayed in the Shelikof Strait protion of the graphic demonstrates the paucity of information available at the writing of the DEIS. The FEIS should incorporate information recently obtained by investigators such as Kienle, Swanson and Hampton.

The dominantly generic information presented on ground failure and ground shaking (graphic 1 and page 145) should be clearly identified as such. Little is said about the specific sediment conditions in Lower Cook Inlet and Shelikof Strait, or the expected behavior of sediments there under load. Similarly, the predictive data presented on ground accelerations are extrapolations from other areas of Alaska, not support by accelerograms from Shelikof Strait.

C. General Comments

There are numerous typographical or other errors in the DEIS and graphics that may be misleading or confusing. Those noted in reading are presented in the detailed comments that follow.

A. DEIS Text

1) p.ii, para. 3, line 11: "..productivity delayed for 10 years or more,...." "Reduced" would seem more appropriate.

2) p. 24: Alternative V gas estimate (360 Bcf) differs from those given in Table II .B.5.a.-1 and p. 44 (316 Bcf).

3) p. 45, last para., p. 46, first para.: the statements about gas production being uneconomical appear to contradict the statements about oil and gas production in para. 2 on page 46.

4) p. 49, last para., line 7: "406" jobs appears erroneous; aappears it should be "428" as per Table III.c.2.b.-1, under "Miscellaneous."

5) p. 53, para. 2, line 3: "1974" appears erroneous. Would this be 1944?

6) p. 105, para. 2, line 6: "affluent" should be "effluent."

7) p. 145, para. 5, line 8: "(Plafter, 1971)" should be "(Plafker, 1971)."

8) p. 146, line 1: cm^2/sec" should be cm/sec^2" if it's an acceleration.

9) p. 153, para. 3, line 5: "(Alaska Petroleum Institute....' should be "(American Petroleum Institute..."

10) p. 159, para. 3, line 5: "larvae" should replace "larval."

11) p. 159, para. 3: While it is true that fishing mortality would confound estimation of effects of oil pollutants on fish stocks, another major confounding effect that should be mentioned is the inherent large natural variability induced by mortality of pre-recruits due to predation, starvation, etc.

12) p. 160, para. 3, line 5: "eliminate" seems a pretty strong term; perhaps "reduce" would be more appropriate.

13) p. 163, line 3: should it be "volatile" instead of "voluble"?

14) p. 163, para. 7; line 4: "larval" should replace "larvae."

15) p. 164, para. 3: comment re p. 159, para. 3 also applies here.

16) p. 164, para. 5: should make it clear that the shrimp naturally change sex during their adult life.

17) p. 165, para. 3, line 2: shrimp wouldn't be reduced, shrimp populations would.

18) p. 166, line 1: wouldn't "side" be preferable to "bank"?

19) p. 166, para. 5: it would be desirable to identify species of clam(s) oiled.

20) p. 166, last line: shouldn't "(+ ten years)" be "(10 + years)"?

21) p. 169, para. 6: last sentence is contradictory.

22) p. 172, para. 2, line 3: "euphaussiid" should be "euphausiid."

23) p. 172, para. 2, lines 7 and 8: might rephrase as "more persistent of the aromatic hydrocarbons." As now stated, one might infer that aromatics are more persistent than other components of oil.

24) p. 175, para. 3, line 13: "proposal" should replace "proposed."

25) p. 176, para. 2: is there any evidence that a LNG accident would pose a significant threat to birds? Would seem the only threat would be a tanker explosion in the vicinity of a colony - a remote possibility.

B. Graphics

The following detailed comments relate to maps, figures and text presented in the graphics accompanying the DEIS. The headings cited are those used in the graphics text:

Graphic 1 - Environmental Geology

a) The illustration of plate convergence (Figure III.A.1 b-1) does not benefit from the listed features because the locations are not visible in the figure.

Graphic 2 - Circulation and Vulnerable Habitat

Since Table III. A.2. a-3 (Annual Maximum Sustained Winds for Selected Return Periods) is based on a model whose predicted lower bound has a negative slope for a return period beyond 100 years, it is recommended that predictions beyond this time frame be deleted from the table.

Meteoroglical Conditions

a) To avoid subjective terms like "moderate" and "heavy", it would be preferable to show a range of precipitation in centimeters and inches.

Skycover (Visibility)

a) Sentences are misplaced, beginning at line 9 in the first paragraph. The missing material appears to be erroneously included as the last 3 lines under Circulation.

b) The description of katabatic winds, erroneously included under Skycover, should be in section on Winds and Storms or given a separate heading. A better description of katabatic winds was given in the DEIS prepared for Lease Sale No. 55.

Circulation

a) Most of the descriptive material on water circulation has been erroneously included under the section on Winds and Storms.

b) The description fails to account for the extreme variability of the currents. The reader should not be led to believe that net currents are either persistent or strong. Much of the transport of material takes place as a result of horizontal mixing due to strong tidal currents.

Winds and Storms

a) para. 3, line 10: replace "on" with "and"

b) para. 4, line 5: "direction" should be "directions."

c) Since a crucial part of the oil spill risk analyses was based on wind patterns and statistics, a figure illustrating those patterns would have been useful.

Tides

a) para. 2: the last sentence of this paragraph is misleading, as the central portion of Lower Cook Inlet has a weaker, not stronger, bottom current regime than areas further up the inlet. It would have been better to say "Although the tidal (bottom) currents are less intense in the middle of Lower Cook Inlet, they retain enough energy to produce large sand waves and ridges."

Spray Ice

a) para. 1, lines 9 and 11: "free board" should be one word, "proned" should be "prone".

b) para. 3, line 1: "structured icing" should be "structural icing."

Surface Trajectories

a) It is unclear why the discussion on oil spill trajectory modeling is included in the text of the DEIS (pages 133-134) and the discussion of drift bottle studies is included in the graphics. Both should have been together, preferably in the DEIS text.

b) The discussion of vulnerable habitats, promised in the introductory paragraph of this section in the graphics, is actually given on pages 138-140 of the DEIS text. This should have been referenced in the graphics discussion.

Salinity

a) para. 1: salinity should be described in parts per thousand, not percent.

Heavy Metals

a) para. 2 speaks of "suspended particulate matter along the same transect," but two transects are identified in the previous paragraph. Which is the antecedent, or are both intended?

b) para. 2 also states that "these areas also can be expected to have higher concentrations of heavy metals....," but for the reason noted under (a) above, the antecedent (and thus the areas) are not clearly identified. Moreover, is the reader to infer that because no special trends were found (para. 1) that the area is anomalous? The implications of the discussion of heavy metal distribution are too vague.

c) para. 3, last sentence: it would have been clearer to the reader if this sentence had said "sediment samples from the area have normal and quite uniform heavy metal content."

Biological Characteristics -- Vulnerable Coastal Habitats

Coastline and Littoral Biota

a) para. 1, line 1: the words "description of the" should be deleted from the beginning of the first sentence.

Graphics 5-8 -- Sport and Commercial Fishing

Bottom Fish

a) para. 6, line 6: replace the word "adults" with "adult females."

Herring

a) para. 7, line 6: Kukak Bay is on the west, not the east, side of Shelikof Strait.

Graphics 5-8 - Commercial Shellfish

a) consistent terminology in legends where identical material is depicted would be helpful. It is not apparent why the king crab graphic shows "important reproduction areas" while the one for Tanner crab shows "rearing and mating areas" and the one for Dungeness crab combines "vital catch and reproduction areas."

Tanner Crab

a) para. 3, (top of col. 3), line 14: "30-million ton limit" appears incorrect. Shouldn't it be "30-million pound limit"?

Graphic 9 -- Terrestial Mammal Resources

Terrestial Mammals

a) Para. 1, line 16: Mustella is spelled with only one "l".

b) Para. 1, line 21: "heinionus" should read "hemionus"

Graphic 10 - Marine and Coastal Bird Resources

Abundance -- Distribution

a) Para. 4, line 15: the reference should be to "Lensink, et al", not "Lensing".

Graphic 11 -- Marine Mammals

a) Para. 1, line 11: Eumotopias should read Eumetopias.

Graphic 12 -- Endangered Species and Non-Endangered Cetaceans

a) The box denoting the area of most probable occurrence for beluga whale is not colored orange as it should be.

Endangered Species

a) Para. 1, line 29: the scientific name for the humpback whale is *Megaptera novaeangliae*.

Gray Whale

a) Para. 3, last sentence: change "anytime" to "any time."

b) Para. 6: if the 1979 population estimate for gray whales migrating from the Bering Sea is taken from Howard Braham's work, his name should be referenced instead of using an "anonymous" citation.

Blue Whale

a) Para. 1, line 17: a "to" should be inserted between "Alaska" and "Vancouver."

Right Whale

a) Para. 1, line 10: "western" should be "eastern."

Northern Right Whale Dolphin

a) The heading and the material immediately after it should come before, not after, the material at the top of the column.

ATTACHMENT IV

Comments on the Draft Environmental Impact Statement
for Lower Cook Inlet - Shelikof Strait, Lease Sale #60
Pacific Marine Environmental Laboratory
National Oceanic and Atmospheric Administration

Our review of the circulation section of the description of the environment (graphic 2 and associated text) was limited to assessing the accuracy of the information presented and its sufficiency for determining the likely path of oil in the marine environment over periods of days and weeks. For these purposes the graphic of annual mean circulation is inadequate and, for some weather regimes, may mislead the decision maker. Furthermore, the scale of the graphic does not permit its use in choosing between tracts.

The currents depicted vary considerably on a seasonal basis. The vector off Gore Point, for example, varies from 20 to 100 cm per second being larger in the autumn. Beyond this, eddies and wind fields can significantly modify currents in some areas. Fluctuations of 2 days to a week occur throughout the region but have the most pronounced effect in areas of weaker currents such as central lower Cook Inlet. Since much of this variation can be attributed to winds and they can be divided into 5 major categories, the task of fully depicting them is not excessive. These variations must be depicted to avoid misleading the reader. Our research indicates the currents on the north side of Portlock Bank are weak and variable, not consistently westward as depicted.

Review of Figures IV.A.1.d. 1 to 18 reveals inconsistencies which can be accounted for only by failure of the model or inadequate proofing. For example, comparing Figures 12 and 13 we expect impacts in Figure 12 to be equal to or greater than impacts in Figure 13. This is because more tracts are leased in Figure 12. The leased areas, tanker routes and pipeline routes are otherwise identical in the two figures. Nevertheless Figure 13 shows greater impacts in areas 76, 77, 78, 79, 83, 84, 85, 86, and 87. Similar errors occur in other figures.

Since many resources occur at sea, analysis showing the probability that spilled oil would cover an area of the sea surface would be valuable. For example, oil passing over the feeding ground of certain birds or mammals could have a significant impact on those populations.

It is also suggested that all color graphics be overlayed with the land segment grid used in Figures IV.A. 1. d. to assist in comparing the probability of impacts with the environmental resources present in the area.

ATTACHMENT V

Comments on the Draft Environmental Impact Statement
for Lower Cook Inlet-Shelikof Strait, Lease Sale #60
Office of Oceanic and Atmospheric Services
National Oceanic and Atmospheric Administration

The review by the Marine Environmental Assessment Division has been limited to descriptions of oceanographic phenomena and oil spill risk analysis.

Table III. A.2.b.-2 gives annual maximum wind and waves for selected return periods. An accompanying discussion appears on the back of Chart III. The discussion should be expanded to indicate the techniques used in computing return period. The reference (Brower et. al., 1977) is not immediately available to us. It is suspected that Tongs method was used in those computations. If this is so, the computations might be suspect and could warrant additional work using more appropriate techniques.

The model used to compute surface trajectories of oil spills is undoubtedly state-of-the-art for that computation. However, at a very minimum, some discussion should be included which would indicate the expected levels of concentrations of oil in the water. When discussing impacts on living resources, dispersal within the water column, or the lack of dispersal, could be extremely important and could significantly modify the findings.

We also note that within the section on Federal Agencies Contacted (page 287) there are two Department of Commerce agencies listed: National Marine Fisheries Service (NMFS) and National Oceanic and Atmospheric Administration (NOAA). It is recommended that only NOAA be listed under the Department of Commerce, as this will include NMFS and any other NOAA component that assisted in the preparation of the DEIS.

The subject statement has been reviewed within the areas of the National Ocean Survey's (NOS) responsibility and expertise, and in terms of the impact of the proposed action on NOS activities and projects. In this connection, we would like to advise the Bureau of Land Management of the National Ocean Survey Oceanographic Circulatory Report on Lower Cook Inlet by Patchen, Bruce, and Dingle. This survey report, in press, should be available in early 1980 from:

Chief, Circulatory Surveys Branch, OA/C211
Office of Oceanography
National Ocean Survey
National Oceanic and Atmospheric Administration
6001 Executive Boulevard
Rockville, Maryland 20852

Advisory Council On Historic Preservation

1522 K Street, NW
Washington, DC 20005

Reply to:
Lake Plaza South, Suite 616
44 Union Boulevard
Lakewood, CO 80228

ALASKA OCS OFFICE
ANCHORAGE, ALASKA
OCT 1 2 38 PM '80

PIO
Chief, Ops
Chief, EA
Chief, MS
Supv. CA
A-Action
I-Info

September 29, 1980

Bureau of Land Management
Alaska OCS Office
P. O. Box 1159
Anchorage, Alaska 99510

Dear OCS Supervisor:

The Council has reviewed your draft environmental statement (DES) for the Oil and Gas Lease Sale #60, Lower Cook Inlet-Shelikof Strait, Alaska circulated for comment pursuant to Section 102(2)(C) of the National Environmental Policy Act. We note that the undertaking will affect numerous archeological and historic sites probably eligible for inclusion in the National Register of Historic Places. Circulation of a DES, however, does not fulfill your agency's responsibilities under Section 106 of the National Historic Preservation Act of 1966 (16 U.S.C. Sec. 470f, as amended, 90 Stat. 1320).

Prior to the approval of the expenditure of any Federal funds or prior to the granting of any license, permit, or other approval for an undertaking, Federal agencies must afford the Council an opportunity to comment on the effect of the undertaking on properties included in or eligible for inclusion in the National Register in accordance with the Council's regulations, "Protection of Historic and Cultural Properties" (36 CFR Part 800). Until these requirements are met, the Council considers the DES incomplete in its treatment of historical, archeological, architectural, and cultural resources. You should obtain the Council's substantive comments through the process outlined in 36 CFR Sec. 800.9. These comments should then be incorporated into any subsequent documents prepared to meet requirements under the National Environmental Policy Act. Ms. Marjorie Ingle may be contacted at (303) 234-4946, an FTS number, for further assistance.

Sincerely,

Louis S. Wall
Chief, Western Division
of Project Review

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

Nov 26 1 56 PM '80

RECEIVED
OFFICE OF THE ADMINISTRATOR
OCT -- 1980

OCT 31 1980

Mr. Frank Gregg
Director
Bureau of Land Management
Washington, D.C. 20240

Dear Mr. Gregg:

The Environmental Protection Agency (EPA) in accordance with its responsibilities under the National Environmental Policy Act and Section 309 of the Clean Air Act has reviewed the draft Environmental Impact Statement (DEIS) for the Outer Continental Shelf (OCS) Oil and Gas proposed September 1981 Lease Sale 60 Lower Cook Inlet-Shelikof Strait. EPA offers the following comments.

We believe the DEIS contains a comprehensive evaluation of the proposed action, but does not adequately discuss the sale alternatives. There needs to be additional justification for particular tract deletions. In particular, we suggest that the final EIS contain more specific information about the resources at risk in each area being considered for deletion and the extent of environmental protection that would be gained by such deletion. Since this is an area with many valuable living resources and productive ecosystems (commercial fisheries and spawning grounds, sensitive marine mammal habitats, and marine and coastal bird colonies) it is essential that the environmental characteristics and potential risks of all possible sale alternatives be as well documented as possible.

Of particular concern to EPA is the limited information available relative to oil spill events. The extreme geologic and climatological hazards of this region increase the likelihood of such a polluting event. Suspected geophysical hazards need to be examined and additional biological research on organisms and vulnerable habitats should be conducted. Since a major spill would also impact the coastal habitats, the final EIS should address, in as much detail as possible, the biological impacts of such a spill on both the marine and terrestrial systems. In addition, there should be a full description in the final EIS on the effectiveness of the available technology to adequately clean up an oil spill in this area.

Finally, reference to the promulgation of EPA's Ocean Discharge Criteria on pages 16 and 102 should be corrected to reflect final promulgation on October 3, 1980. The guidelines become effective on November 3, 1980.

In view of our concerns with the site alternative description, we have rated this draft statement ER-2, environmental reservations, insufficient information.

Thank you for the opportunity to comment on this draft statement.

Sincerely yours,

William N. Hedeman, Jr.
Director
Office of Environmental Review (A-104)

STATE OF ALASKA
OFFICE OF THE GOVERNOR
DIVISION OF POLICY DEVELOPMENT AND PLANNING

JAY S. HAMMOND, Governor

POUCH AD
JUNEAU, ALASKA 99811
PHONE: 465-3573

OCT 20 PM '80

October 14, 1980

Ms. Esther Wunnicke, Manager
BLM OCS Office
P.O. Box 1159
Anchorage, Alaska 99510

State I.D. No. SG 120-8002703ES

Dear Ms. Wunnicke:

The State of Alaska appreciates the opportunity to review the draft Environmental Impact Statement (EIS) for federal oil and gas lease sale 60 in Lower Cook Inlet and Shelikof Strait. As you know, Governor Hammond has generally favored this sale, considering it to be in both the National and State interest if held during the period 1980-1985. Consistent with this overall endorsement of the sale, the State responded on April 2, 1979 to the Call for Tract Nominations. At that time, the State endorsed the inclusion of a number of tracts, indicating, however, that those in lower Shelikof Strait should be deleted. Also recommended for deletion were certain nearshore tracts in Upper Shelikof Strait and in Lower Cook Inlet. Among the reasons for our position were 1) the extraordinarily high fisheries and other wildlife values, 2) particularly high geologic hazards in certain parts of the sale area and, 3) the anticipation that water circulation and wind patterns could cause impingement of spilled oil on key fish and wildlife populations.

The purpose of this letter is to present a State position on the draft EIS that best reflects the most recent information on the sale area, and integrates the concerns and recommendations of the Departments of Natural Resources, Environmental Conservation, Community and Regional Affairs, and Fish and Game as well as the Oil and Gas Conservation Commission.

Adequacy of Draft EIS

Within the scope of available information, the State feels that much of the draft EIS is relatively comprehensive and accurate in its treatment of major anticipated impacts. There are, however, significant data and information gaps in portions of the EIS which make it difficult to adequately assess impacts and develop effective mitigating measures.

Physical Science Information. The information drawn from the OCS Environmental Assessment Program (OCSEAP) applies almost exclusively to Lower Cook Inlet, leaving the impression that little is known of Shelikof Strait. It is true that the Strait was not identified as a potential OCS lease area for the first five years of the environmental research program, and thus was ineligible for site-specific studies. However, the region is a geologic extension of Lower Cook Inlet and is part of the major inshore Gulf of Alaska Continental Shelf circulation system. As a result, a considerable amount of very relevant physical oceanographic and meteorologic research has been performed in the region. Although this knowledge is essential to the determination of probable pollutant dispersion and trajectories, little of it is incorporated into the draft EIS. Among the significant BLM-sponsored research already available are the following papers:

Harding, J.M. 1976. Tidal Currents and Pollutant Dispersal in the Western Gulf of Alaska as derived from a Hydrodynamical-Numerical Model, OCSEAP Quarterly Reports, July-September, V. 3, pp. 781-825.

Lindsay, R.W. 1980. A Study of Mesoscale Wind Patterns on the south Alaskan coast, Appendix I to OCSEAP Annual Report of RU 367 (in press; submitted to BLM 1 April 1980).

Macklin, S.A., R.W. Lindsay, and R.M. Reynolds 1980. Observations of Mesoscale Winds in an Orthographically-Dominated Estuary: Cook Inlet, Alaska, Appendix III to OCSEAP Annual Report of RU 367 (in press; submitted to BLM 1 April 1980).

Schumacher, J.D., R.L. Charnell, S.P. Hayes, H. Mofjeld, and R.D. Muensch 1978. Gulf of Alaska Study of Mesoscale Oceanographic Processes, OCSEAP Annual Reports, V. 9, pp. 61-213.

Schumacher, J.D., R.K. Reed, M. Grimsby, and D. Dreves 1979. Circulation and Hydrography near Kodiak Island, September to November 1977, NOAA Tech Memo ERL-PMEL 13, 49 p.

Schumacher, J.D., R. Sillcox, D. Dreves, and R.D. Muensch 1978. Winter Circulation and Hydrography over the Continental Shelf of the Northwest Gulf of Alaska, NOAA Tech Memo ERL 404-PMEL 31, 16 p.

Despite their value, we find no indication in the text that the authors of the draft EIS were aware of these studies.

When Shelikof Strait was added to the proposed lease areas, OCSEAP made a considerable effort to fill in major data gaps for the region. These studies, admittedly accelerated by time constraints, were designed to produce particularly important supplementary information in time to be incorporated in the final EIS. Among this work is the coastal vulnerability classification by Hayes (RU 59), field work for which was conducted in the summer of 1980, with a report due later this month, and sea floor hazards studies by Hampton (RU 327), with a report due on 1 December 1980. Such critical studies should have been included in the draft EIS by reference, at least, and are certainly appropriate for the final statement.

Biological Information. Other new information which should be incorporated and considered in the analysis includes recent indications of major pollock spawning activity in Shelikof Strait, and surveys demonstrating that 75-85 percent of the Lower Cook Inlet crab harvest is taken from one area east southeast of Augustine Island. These data are available in commercial fisheries summaries by the Alaska Department of Fish and Game.

In addition to adding new information, there is material in the draft EIS which could be cited more accurately. For example, the major Lower Cook Inlet halibut fishing areas are actually in Kamishak Bay and not in Kachemak Bay as shown in Graphic 4. Several of the data sources used in the draft EIS, such as the ADF&G Fisheries Atlas, are already at least partially out of date and have been updated or superceded by more recent reports.

And finally, there is valuable biological research that remains to be done in Shelikof Strait. As suggested on page 41 of the draft EIS, more information is needed on finfish and shellfish populations, marine mammals and cetaceans, marine and coastal birds, and vulnerable coastal habitats. Specific study needs are as follows:

1. Birds
   a. Surveys to assess summer and winter abundance and distribution of seabirds in Shelikof Strait and Kodiak Island Bays.
   b. Surveys to assess seasonal abundance and distribution of waterfowl in Shelikof Strait and Kodiak Island Bays.
   c. Studies to identify seabird colonies between Puale Bay and Cape Douglas on the north side of Shelikof Strait and between Malina Bay and Uganik Island on Kodiak Island.
   d. Determine seasonal abundance, feeding distribution, and food habits of seabirds in Shelikof Strait colonies.
   e. Conduct studies to determine sensitivity of nesting, feeding, and staging waterfowl and seabirds to noise and disturbance.

2. Marine Mammals
   a. Conduct surveys to determine seasonal abundance and distribution of harbor seals, sea otters, and sea lions in Shelikof Strait. Determine feeding, pupping, and haulout areas.
   b. Determine abundance and distribution of whales in Shelikof Strait.
   c. Determine seasonal food habitats of sea lions, whales, and harbor seals. Determine relationship between seasonal demersal fish concentrations and marine mammal concentrations.
   d. Determine seasonal movements of marine mammals in Shelikof Straits.
   e. Conduct studies to determine sensitivity of sea lions, sea otters, seals, and whales, to noise and disturbance including submarine noises.
3. Fish
   a. Determine abundance and distribution of demersal and pelagic fish in Shelikof Strait.
   b. Determine abundance, distribution, and life history of large pollock schools found seasonally in Shelikof Strait.
   c. Determine seasonal abundance and distribution of pelagic eggs larvae, and juveniles of demersal, and pelagic fish in Shelikof Strait.
   d. Determine larval crustacean (king, tanner, dungeness crab, and shrimp) release areas and patterns of larval drift and development in Shelikof Strait.
   e. Determine migrational patterns of adult and juvenile pelagic demersal and anadromous fish in Shelikof Strait.
   f. Determine effects of non-explosive seismic sources on juvenile pelagic and anadromous fish.

4. Human Use
   a. Determine human use (recreational and subsistence) of fish and wildlife in the Shelikof Strait region including 1) areas used and 2) species and quantities harvested.
   b. Determine effect of increased population and competition for subsistence and recreational resources resulting from primary and secondary effects of offshore oil and gas exploration, development, and production.

More specific comments on the data and information in the draft EIS are contained in Enclosure 3.

State Positions on Sale Alternatives

On the basis of our review of the EIS, the existing level of research information for Shelikof Strait, and an awareness of the Kodiak Island Borough's emerging position, the State takes the following positions on lease sale alternatives:

State's Primary Position on Tract Configuration. The State's preferred tract configuration is a modification of Alternative IV in which the following deletions and additions are recommended (see also Figure 1):

1. Tracts to be deleted.

   92, 131, 317, 361, 405, 484, 527, 615, 625, 659, 669, 703, 713, and 757.

2. Tracts to be added back in.

   93, 94, 137, 138, 181, 182, 186, 224, 225, 226, 228, 229, 230, 268, 269, 270, 271, 272, and 273.

These changes together with the mitigating measures referred to below would make Alternative IV consistent with the information currently available to the State. It would also acknowledge the Kodiak Island Borough's position (Enclosure 1) that, secondary to its preference for a sale delay, it would like to see the deletion of all tracts in Shelikof Strait as well as those tracts in Cook Inlet that pose a serious threat of adverse impacts.

In developing this position, the following considerations have been taken into account.

1. Very little biological research has been conducted in Shelikof Strait, and as a result, it would be useful to have more information upon which to base a leasing decision for this area.

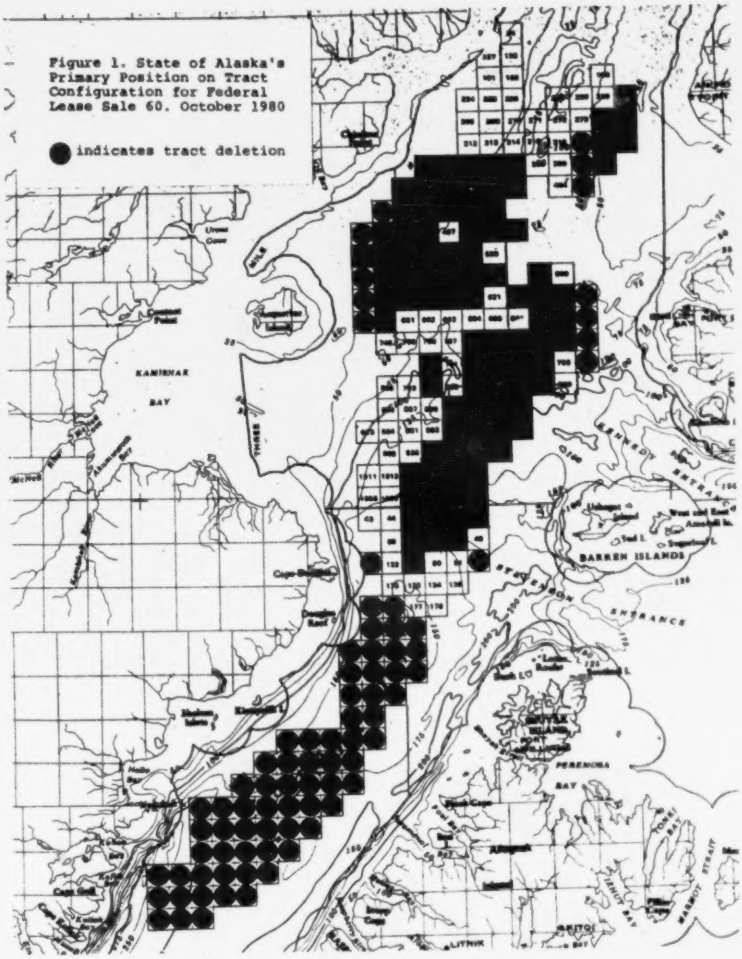


Figure 1. State of Alaska's Primary Position on Tract Configuration for Federal Lease Sale 60. October 1980

● indicates tract deletion

2. Substantial new fisheries information has become available which indicates that extremely large schools of pollock move into Shelikof Strait during the fall and winter months. Sonar records indicate that these schools may measure from 30-100 miles in length and from 10-15 miles wide. The size of the schools and timing of the movements has led to the reasonable speculation that Shelikof Strait may be the major pollock spawning grounds for the entire Gulf of Alaska - Aleutian Shelf region. Because pollock eggs are pelagic and float at the surface during the early stages of development, they are extremely vulnerable to any type of surface pollution such as an oil slick. This vulnerability should be a significant factor in the decision to lease in Shelikof Strait.

3. A substantial number of tracts have been included in the proposal (Alternative I) which the State has asked to be deleted from both sale CI and sale 60. These include Shelikof Strait tracts 92, 131, 219, 263, 306, 307, 309, 350, 479, 483, 522, 565, 570, 607, 608, 651, 695, 737, 738, 781, 782, 825; Augustine Island tracts 484, 527, 615, 659, 703; and Kachemak Bay tracts 186, 229, 230, 273, 317, 361, 405, 625, 669, 713, and 757. Deletion of these tracts was previously requested in the State's April 2, 1979 response to the Call for Nominations because of geologic hazards or because they presented a substantial oil spill threat to State-owned lands and resources.

4. There is strong opposition to the inclusion of the Shelikof Strait tracts by both local governments and fish and wildlife resource users.

5. A modified alternative IV would reasonably allow exploration of federal tracts in the Cape Douglas region while protecting State interests in the Shelikof Strait - Kodiak Island Region.

At such time as there is a more complete biological information base upon which to develop mitigating measures in Shelikof Strait, the State would consider the area ready to be leased. The State continues to think that this is possible during the period 1980-1985.

State's Alternate Position on Tract Configuration. If a decision is made that it is in the National interest to lease tracts in Shelikof Strait, despite the considerations described above, then the State recommends a modification of Alternative I in which these additional tracts are deleted (see also Figure 2):

1. Tracts recommended for deletion because of the substantial oil spill threat presented to State resources.
    a. Shelikof Strait tracts - 92, 131, 219, 263, 306, 307, 309, 350, 483, 522, 565, 570, 607, 608, 651, 695, 737, 738, 781, 782, and 825.
    b. Kachemak Bay tracts - 317, 361, 405, 625, 669, 713, and 757.

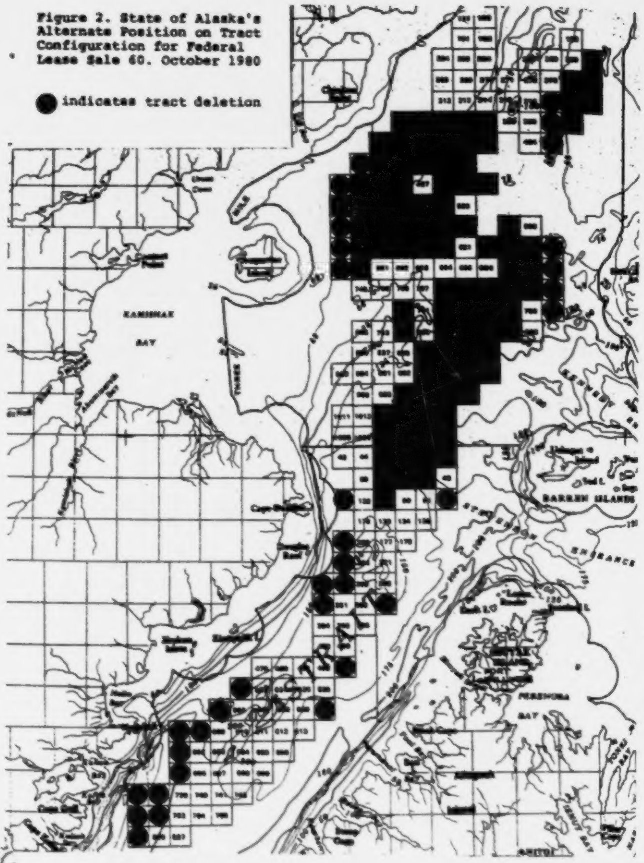


Figure 2. State of Alaska's Alternate Position on Tract Configuration for Federal Lease Sale 60. October 1980

● indicates tract deletion

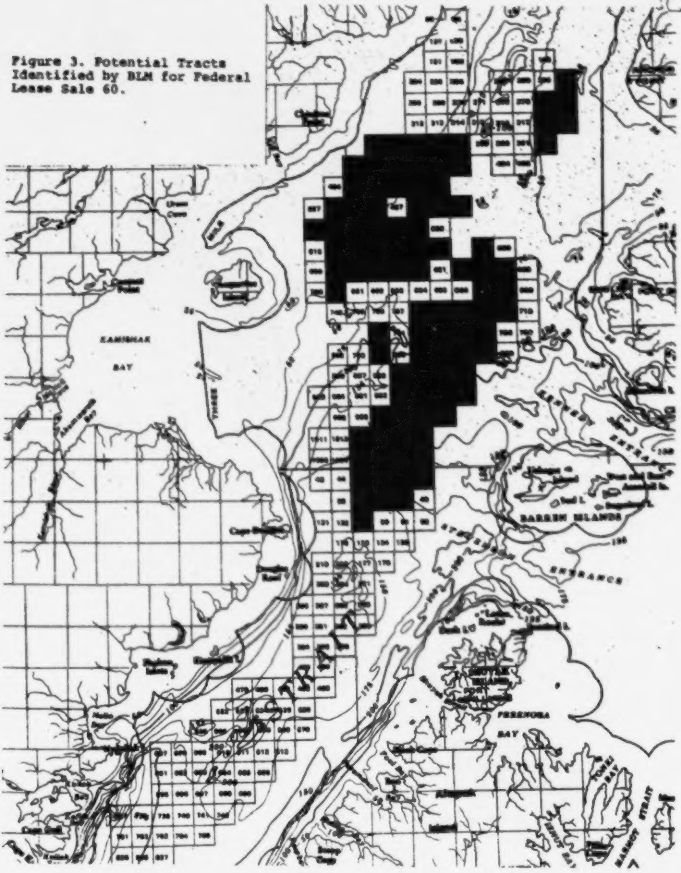


Figure 3. Potential Tracts Identified by BLM for Federal Lease Sale 60.

2. Tracts near Augustine Island recommended for deletion because of substantial geophysical hazard - 484, 527, 615, 659, and 703.

These tract deletions together with the mitigating measures referred to below would bring Alternative I into approximate conformance with the State recommendation on the Call for Nominations.

Proposed Mitigating Measures

The two State positions identified above are predicated upon the adoption of mitigating measures described in Enclosure 2. We consider these essential if the State's resources and public interests in the area of the sale are to be adequately protected. The enclosure contains BLM's proposed mitigating measures, with appropriate modifications, and additional measures where the State's interests are not otherwise protected.

Local Coastal Management Planning

I should also point out that one of the State's criteria for supporting sale 60 during 1980-1985 has consistently been that of community preparedness. The State continues to feel that the Kenai Peninsula Borough and Kodiak Island Borough coastal management plans need to be sufficiently developed by the sale date that local communities will be able to adequately cope with impacts resulting from the sale. In this regard, we are encouraged by the fact that both boroughs have been making progress in their coastal management planning efforts.

In Closing

Once again, the State appreciates this review opportunity, and we would welcome any further chance for individual State agencies or this office to help make the final EIS the thorough document that you and we both would like it to be. Please do not hesitate to call on us in the weeks ahead.

Sincerely,

Frances Ulmer

Frances A. Ulmer
Director

Enclosures: (3)

cc w/enclosures: Mr. Frank Gregg, Director, Bureau of Land Management
Mr. Joe Jones, Conservation Manager, U.S. Geological Survey, Anchorage
Honorable Dan Ogg, Kodiak Island Borough Mayor
Honorable Don Gilman, Kenai Peninsula Borough Mayor
Members of Alaska Regional Technical Working Group
Mr. Gerald Mylroi, Office of Coastal Zone Management, U.S. Department of Commerce

Enclosure 1 to Ms. 1 aces Ulmer's October 14, 1980 1 ter to Ms. Esther Wunnicke regarding oil and gas lease sale 60.

October 2, 1980

Mr. Bruce Baker, Policy & Program Specialist
State of Alaska
Office of the Governor
Division of Policy Development & Planning

Dear Bruce,

As you are aware of the Kodiak Island Borough ahs adopted the OCS Advisory Council recommendation to support Alternative III (delay of sale) in DEIS Lease Sale #60 by motion

To assist the State in forming its position concerning this sale I will explain the Borough's method of approach:

1) To critique the DEIS through a page by page review and to illustrate the inconsistencies of this draft relating to NEPA regulations as well as general content.

2) Address the need for updated data specifice on the fishery resources in Shelikof Strait. Address the extreme lack of site specific data in all alternatives and impacts.

3) Contend the oil spill trajectory models applicability and to introduce contrary testimony concerning the models' inefficiencies.

4) Submittal of supportive testimony to request BLM/OCS to recognize accumalitive impacts to Kodiak from Lease Sale #60 and #61.

It is important for the State be aware that the Borough will also prepare a secondary approach to Alternative III at the public hearing. This approach would request deletion of all tracts within the boundaries of the Shelikof Strait region and those tracts within the Cook Inlet that propose a threat of adverse impacts to the Strait. Those tracts have not yet been identified however, after review of satellite weather photos the Borough will have identified those Cook Inlet tracts before the hearing dates.

Therefore, in summary, the Borough will support Alternative III through a dual concept approach. It is hopeful that the State supports the Borough's position of the sale. Good luck in the endeavor of formulating the State's position.

Sincerely,

Thomas Peterson, Chairman
OCS Advisory Council

cc: Kristina O'Connor
State of Alaska
Dept of Natural Resources

Kodiak Island Borough
OCS Advisory Council
Telephone (907) 486-5736 P.O. Box 1246
Kodiak, Alaska 99615

At a meeting of the Kodiak Island Borough Assembly on October 3rd, 1980, Mr. Jerome Selby moved that the formal position of the Kodiak Island Borough on Lease Sale #60 be Alternative III, delay of the sale, on grounds of:

1) Inadequate document
2) Lack of address of Cumulative Impact
3) Lack of Technological Capability of Oil Companies to Contain a Spill.

And in the event the sale is consummated, we are adamantly opposed to drilling at this time south of the Cape Douglas-Barren Islands line.

This motion was seconded by Dave Wakefield and passed by a unanimous voice vote.

Enclosure 2 to Ms. Frances Ulmer's October 14, 1980 letter to Ms. Esther Wunnicke regarding federal oil and gas lease sale 60.

MITIGATING MEASURES PROPOSED BY THE STATE OF ALASKA

I. The BLM-proposed mitigation contained in the draft EIS is supported by the State, contingent on the following changes:

A. Mitigating measures in place which should be adopted:

1. Protection of Cultural Resources. The State feels that this measure should be expanded to include 1) a provision for locating and protecting cultural resources on land and 2) the need that is emphasized in the National Historic Preservation Act for consultation with the State Historical Preservation Officer. If these measures cannot be reflected in the final presale EIS and Sale Notice, then they should be reflected in the Development EIS.

B. Potential Mitigating Measures which should be adopted as part of the proposal:

1. Mitigating Measure Number 1. Well and Pipeline Requirements. This measure should be adopted with the following addition: All unburied pipelines shall be designed and constructed to allow for the free movement and safe passage of migrating epibenthic marine organisms including king, tanner, and dungeness crab.

There is a great deal of concern that crabs cannot climb over the smooth surface of large unburied pipelines, and that the extensive network of gathering lines and onshore pipelines will block or channelize essential movements of crab populations. This change will eliminate any potential problems.

We also suggest that the clause and to the United States Coast Guard for notification of mariners be added to the sentence beginning with "Latitude and longitude coordinates ...." The Coast Guard should be kept informed of all potential hazards to navigation and fishing interests in the lease sale area and should disseminate this information to mariners such as fishermen that might be affected by OCS oil and gas development.

2. Mitigating Measure Number 2. Transportation of Hydrocarbon Products. This measure should be adopted with the following changes:

a. This mitigating measure states: "In selecting the means of transportation, consideration will be given to any recommendations of the Intergovernmental Planning Program for assessment and management of transportation of Outer Continental Shelf Oil and Gas with participation of Federal, State, and local government and industry." Following this statement, a new sentence should be added as follows. The routing of all pipelines carrying OCS products to shore will also be based upon direct communication and cooperation determined jointly by between the State and Federal governments.

The views expressed by the Regional Technical Working Group through the BLM-sponsored Intergovernmental Planning Program, while useful, do not necessarily represent the official positions of the State of Alaska. Because of the State's interest in petroleum transportation planning, it is essential that direct, official State-federal dialogue and cooperation take place if the balanced interests of State agencies are to be adequately represented.

b. Add to the sentence: "All pipelines, including both flow lines and gathering lines for oil and gas, shall be designed and constructed to provide for adequate protection from water currents, storms, subfreezing conditions, fisheries trawling gear, and other hazards," and shall provide for free movement and safe passage of migratory epibenthic organisms.

The reason for this proposal appears under B.1. above.

c. Add and the Port and Tanker Safety Act of 1978 (336 S.C.1221). to the end of the last sentence of the proposed stipulation. In 1978, a new piece of legislation concerning tank vessels and ports was passed by Congress which set up stringent operating and design standards for tankers trading in the U.S. This law should be referenced in this stipulation along with the Ports and Waterways Safety Act of 1972.

3. Potential Mitigating Measure Number 3. Environmental Training Program. This stipulation should be adopted with the following addition: "The program shall also be designed to increase the sensitivity and understanding of personnel to community values, customs, and lifestyles in areas in which such personnel will be operating," and particular emphasis will be placed on avoidance of conflicts with commercial fishing operations and with stationary commercial fishing gear.

Residents of Lower Cook Inlet and Kodiak are very concerned about displacement of commercial fishing operations from productive fishing areas by lease operations, and inadvertent or careless destruction of fishing gear by support vessel operations. The inclusion of this concern in the Environmental Training Program will help mitigate this problem.

4. Potential Mitigating Measure Number 4. Disposal of Drilling Muds, Cuttings, and Formation Waters. Although under certain circumstances the discharge of formation waters and drilling muds can be a serious environmental problem, Mitigating Measure Number 4 does not offer a significant degree of relief. The major problem is that sufficient information is not available to assess the impacts of formation waters and drilling muds on the different marine environments found in the proposed sale area, and that the collection of any additional information is solely at the discretion of the District Conservation Manager (DCM). Furthermore, even if there are sufficient data to indicate that a conflict exists between biological resources and discharges of formation waters and drilling muds, the DCM is not required to stipulate an alternative means of disposal. The current wording of the mitigation says only that the "DCM may require the leasee to reinject formation waters."

   The wording of mitigating measure 4 should be changed to:

   If the DCM is provided with substantial biological or physical evidence that the discharge of drilling muds or formation waters may adversely affect marine resources, he will either:

   a. prohibit the discharge of drilling muds or formation waters, or;

   b. require definitive studies to resolve the issue.

5. Potential Mitigating Measure Number 5. Protection of Biological Resources. This measure should be adopted as written. The optional wording, "the DCM may require a survey" should be rejected.

Information to Lessees which should be adopted as part of the proposal:

1. Information on Bird and Mammal Protection. The wording of this measure should be adopted as written.

2. Information concerning Fairways. The wording of this measure should be modified as follows to reflect consideration of critical fishing areas.

Some of the tracts offered for sale may fall in areas which may be included in fairways, precautionary zones, or traffic separation schemes which may be established, among other reasons, for the purpose of protecting critical fishing areas. Bidders are advised that the United States reserves the right to designate necessary fairways through leased tracts pursuant to the Ports and Waterways Safety Act (33 6 S.C. 1223 (c) and 33 U.S.C. 1224), as amended."

Commercial fishing is extremely important to the area encompassed by the sale area and the proposed fairway statement should reflect this fact, as it did in the Final Notice for sale 55. The second change made is the addition of the reference to 33 U.S.C. 1224 which refers to the Coast Guard having to consult with interested parties in the fairway designation process. This will ensure local, as well as State, input to the Coast Guard decision regarding fairway locations.

II. Mitigating measures recommended by the State of Alaska. In addition to the mitigation recommended by BLM, a number of additional mitigating measures are necessary to adequately protect the State's renewable resources and resource users in the area of the sale. These are:

A. Biological Task Force. A biological task force should be established in the lease agreement to advise the District Conservation Manager and the Secretary of the Interior on the interpretation and implementation of biological stipulations. This Task Force should be modeled after the Beaufort Sea Task Force and should be comprised of the USF&WS, NMFS, BLM, USGS, ADF&G, DNR, and ADEC.

B. Development EIS. It should be indicated in the Sale Notice that a Development EIS is to be written in the event of a commercial oil discovery in either Cook Inlet or Shelikof Strait.

C. Oil Spill Response. An effective oil spill response capability must be a prerequisite for additional leasing in Shelikof Strait and Lower Cook Inlet. A careful review of the effectiveness of previous oil spill containment and cleanup efforts in Alaska and similar environments around the world, and the capabilities of existing equipment and cleanup organizations indicates that a major or medium oil spill in Alaskan waters normally could not be contained or cleaned up before it impacts important fish and wildlife resources or habitats. The U.S. Coast Guard does not yet have the capability to contain or clean up oil in over 6-foot waves, 15-knot winds, or icing conditions. These conditions are exceeded at least 50 percent of the time in most Alaskan OCS areas. The present ability of the Coast Guard, which has primary responsibility for marine oil spills, to contain and clean up oil spills was the main theme of the Coast Guard's August 26, 1980 testimony before the House Committee on Merchant Marine and Fisheries where the

Coast Guard representative concluded by saying "In closing Mr. Chairman, I must say quite candidly that I do not believe there now exists an in-place capability to respond to a major spill in the OCS." Based on our analysis of current oil spill containment and cleanup capabilities it appears that BLM has allowed Alaskan OCS areas to be leased and USGS has approved drilling plans without the ability to contain and clean up a pollution incident which might result from lease development and production. To correct this serious deficiency we feel that minimum acceptable oil spill containment and cleanup performance standards should be provided to the lessee and to USGS in the lease document. The standards should be:

1. Sufficient oil spill containment and cleanup equipment should be available in the lease area to contain and clean up the maximum probable project spill (i.e., pipeline break, wild well, or tanker accident). This should accommodate at least 100,000 barrels of oil.

2. The oil spill response organization must demonstrate a capability to reach critical fish and wildlife habitats before a spill does. This means that for nearshore tracts, the operator must be able to reach adjacent areas in Lower Cook Inlet or Shelikof Strait within 6 hours.

3. The operator must be able to contain or clean-up oil under the environmental conditions prevailing in the lease area, specifically including icing conditions, 80-knot winds, 20-foot waves, 25-foot tides, and 5-knot currents. If the lessee or operator cannot demonstrate this capability then the USGS should insure that specific phases of drilling operations, or surface oil transport operations with a significant chance of an oil spill, are scheduled during periods when the operator can guarantee that he can protect important fish and wildlife populations or habitat from spills.

4. The plan should be oriented toward protection of sensitive fish and wildlife habitat and populations such as razor clam beaches, sea bird colonies, salt marshes, and intertidal salmon spawning areas. The operator should be required to demonstrate that he has identified these areas and has developed positive methods of protecting them such as exclusion booming or diversion booming. A description of sensitive fish and wildlife habitat in the Cook Inlet portion of the proposed sale area is provided in the ADF&G report entitled, Recommendations for Minimizing the Impacts of Hydrocarbon Development on the Fish, Wildlife and Aquatic Plant Resources of Lower Cook Inlet.

D. Protection of Critical Fishing Areas. Two areas have been identified which produce the majority of the king and tanner crab harvested in the sale 60 lease area. The area southeast of Augustine Island, including tracts 661, 662, 663, 704, 705, 706, 707, 748, 750, 751, 793, 794, 795, 836, 837, 838, 839, 880, 881, 882, 883, 923, and 924, produces approximately 75-80 percent of the king and tanner crab harvested in Lower Cook Inlet. Similar concerns exist for the important Shelikof Strait tanner crab fishing area located southeast of Cape Douglas. Fishermen are concerned that oil and gas exploration and development will not only adversely affect crab production but may also displace fishermen and stationary gear from these critical fishing areas. This displacement will result in part from the siting of drilling rigs in a heavily fished area, but primarily from supply and support vessels which affect a much larger area in their maneuvers around the drilling platform. This constant maneuvering can endanger fixed fishing gear, such as crab pots, especially during the hours of darkness since support vessels do not have specialized lights to spot fishing buoys and lines and may not detect this gear. Although the magnitude of this problem is impossible to quantify at this time, the Department of Fish and Game has recommended that this is a legitimate State concern which should be addressed by BLM. We have carefully reviewed the existing measures available to mitigate the problem, and find that none are satisfactory. The most appropriate mitigation presently in effect is the Fishermen's Compensation Fund; however, this fund is limited because it only addresses the problem on a case-by-case basis and can only cover a maximum liability of $100,000. The value of the crab pots alone that are fished by a single $500,000 Alaskan fishing vessel may exceed $250,000.

E. Potential conflicts with commercial fishing. To mitigate potential conflict between lease operations and commercial fishing, one of the following measures should be adopted as part of the lease document:

   1. Establish a committee comprised of fishermen and industry representatives to arbitrate conflicts between lease operations and fishing activities in Shelikof Strait and Lower Cook Inlet. Retain an arbitrator to settle disputes which cannot be settled by the committee.

   2. Schedule exploratory drilling and lease operations in the heavily fished king and tanner crab area southeast of Augustine Island during the closed crab fishing season. The crab fishing area includes tracts 661, 662, 663, 704, 705, 706, 707, 748, 750, 751, 793, 794, 795, 836, 837, 838, 839, 880, 881, 882, 883, 923, and 924 (Tracts 704, 750, 794, 838, and 883 were, however, leased in sale CI.). If oil is discovered and permanent installations are installed, or if it is impossible to schedule exploratory drilling operations around fishing operations, displaced fishermen should be compensated for the diminished catch resulting from the area removed from fishing.

3. If scheduling of leasing operations to avoid fisheries conflicts or compensation for loss of fishing grounds cannot be accommodated by BLM then the State recommends deletion of the following tracts: 661, 662, 663, 705, 706, 707, 748, 751, 793, 795, 836, 837, 838, 880, 881, 882, 923, and 924.

Enclosure 3 to Ms. Frances Ulmer's October 14, 1980 letter to Ms. Esther Wunnicke regarding federal oil and gas lease sale 60.

SPECIFIC COMMENTS ON THE DRAFT EIS AND GRAPHICS

I. State Agency Comments on Specific Draft EIS Issues

P. i-iv The Oil and Gas Conservation Commission raised some questions which, although answered to some degree later in the text, point out three basic concerns that the Commission has with respect to the adequacy of the EIS.

1. Statements such as those regarding percentage probabilities of recoverable reserves and commercial fisheries impacts should be carefully documented. In other words, estimates or anticipated events should be based on clearly indicated facts and assumptions and should be sufficiently qualified when appropriate.

2. To the extent possible, past experience from Upper Cook Inlet should be utilized in making future impact projections.

3. BLM should continue its effort to identify positive benefits and enhancements that result from lease sales, as well the potentially adverse effects that are anticipated.

P. 11 The $250,000 total liability or $300 per gross ton liability limit for vessels is highly inadequate. Most of the major spills in recent history have involved oil tankers and barges, and cleanup costs have run as high as $30,000,000 for a single incident. Cleanup costs in Alaska will run into the thousands of dollars per ton of oil spilled, and total costs will probably be 2-3 times as great as those for developed areas. Coast Guard testimony at a recent oil spill conference in Anchorage indicates that they have actually collected less than 30¢ per dollar of cleanup costs expended on cleaning up oil spilled by vessels in Alaskan waters. Because of these limitations the Offshore Oil Pollution Compensation Fund cannot be considered adequate mitigation for spills resulting from OCS lease operations in Alaska.

P.11 The Fishermen's Contingency Fund which currently has a $100,000 liability limit, and limits collectable damage to those resulting from a fixed unmarked object severely limits its usefulnes in mitigating impacts in Alaskan waters. A single Alaskan crab vessel and gear may cost in excess of $1,000,000. Additionally, most conflicts will not result from bottom obstructions but will occur as a result of conflicts between support vessels and fixed fishing gear, between support vessels and commercial fishing vessels, or as a result of displacement of fishermen from prime fishing areas or harbor space. To be responsive to Alaskan problems the liability limit should be increased to $3,000,000, and coverage should be expanded to include the conflicts identified in the preceeding sentence.

P. 12 Most State agencies are unable to utilize the Intergovernmental Planning Program (IPP) as a "cooperative planning process among Federal and State agencies" as stated in the draft EIS. There is only one State representative on the IPP, a representative of DNR's Division of Minerals and Energy Management. This person provides technical advice and assistance and co-chairs the Regional Technical Working Group along with a member of BLM. Page 8 of USDI's charter document establishing the IPP clearly indicates that co-chairpersons "cannot commit their organizations to policy." Without a significant change in the IPP charter that would 1) allow policy as well technical matters to be negotiated and 2) allow for membership of other interested State agencies, the IPP simply cannot serve as a true "cooperative planning process among Federal and State agencies." The BLM OCS Manager for Alaska has recognized this situation, and we request that the IPP be referred to in the final EIS as an advisory rather than a cooperative State-federal forum.

P. 23 The resource estimates include primary production only. It is unrealistic in these times not to also consider secondary recovery.

In regard to environmental training, it might be useful to indicate the benefits to the environment, local cultures, and the economy that results from training expenditures. Past experience with this program would be instructive to cite.

P. 27-28 We note with considerable concern that the stipulation protecting cultural resources makes no mention of providing for the location and protection of cultural resources on land that may be affected, nor does it mention the need, as specified and stressed in the National Historic Preservation Act, for consultation with the State Historical Preservation Officer. The State's review indicates that some of the areas suggested in the proposal for impact may adversely affect significant cultural resources.

P. 27-35 Mitigating measures - see Enclosure 2.

"Groundfish, halibut, and other populations of demersal fish species may be reduced by the effects of oil spills to some unquantifiable amount during the life of the proposal in the Shelikof Strait area. This is especially true of halibut, a species widely distributed within the Strait and whose larvae are subject to pollution risk for six months of the year."

P. 38 BLM has not specifically addressed the potential impact that the proposed lease sale may have on the large spawning population of walleye pollock that occurs in Shelikof Strait. Evidence suggests that this area may be the largest single concentration of pollock in the Gulf of Alaska. The eggs, since they float at the water surface, would be highly sensitive to oil spills.

P. 38 "The proposed sale would have little affect on the Kodiak, Homer, Port Lions, Seldovia, and Kenai commercial fisheries as a whole. Fisheries impacts that may occur from chronic and catastrophic oil spill events are expected to be localized. Multiple-use conflicts between oil and gas activity and commercial fishing should be localized, of relatively short duration, and subjct to remedial action."

This statement tends to underrate the potential risks that oil and gas exploration and development pose to commercial fisheries in Lower Cook Inlet and Shelikof Strait. The draft EIS itself addresses numerous scenarios which under certain plausible circumstances could have a significant impact upon commercial fishing and fisheries resources. Certain "localized" areas within the proposed lease area support concentrated fishing activities and fisheries resources which, if precluded from use by drilling activities or damaged by spills, could significantly affect commercial fisheries over a much larger area. The State has this information in its files and would be glad to share it with the BLM if requested to do so.

P. 44 In regard to the start of production in 1986, we believe that this is an overly optimistic date.

P. 96 We concur with the projected date for a fall 1981 completion date for the Kenai Peninsula Borough's coastal management program. A State Attorney General's office opinion indicates, however, that as a result of the A.L.I.V.E. decision, district coastal management programs do not require legislative approval. The opinion indicates that for local programs to be subject to legislative approval, either 1) the Legislature would need to amend the Alaska Coastal Management Act to indicate that legislative approval would be given by act rather than by resolution or 2) the State Constitution would need to be amended to allow legislative approval by resolution. The implication is that if the Legislature does not amend the law as described above, the Kenai program could be in place somewhat earlier than has been anticipated.

While on the subject of the Kenai Peninsula Borough, we suggest that the final EIS include recommendations from the Borough's Ports and Harbors study and Facility Siting study, assuming that they are available in time to do so.

P. 102-105 The statement on page 102 that "...State water quality management does not require evaluation of marine sediment quality . . .as indicator(s) of marine water quality" is incorrect. The State of Alaska standard for petroleum hydrocarbons includes the following criterion: "There shall be no concentration of hydrocarbon, animal fats or vegetable oils in the sediment which cause deleterious effects to aquatic life." This criterion clearly acknowledges the importance of this receptor as a "sink" for hydrocarbons. Indeed, the Department of Environmental Conservation invariably requires sediment hydrocarbon monitoring as a condition of nearshore discharge permits (NPDES on wastewater disposal). Examples which we reference include: Alyeska Pipeline Service Company ballast facility, ALPETCO refinery discharge permit, and the Waterflood Project. DEC requests that this section acknowledge this requirement.

The section on Hydrocarbon Concentrations is generally well written and includes very useful information. We recommend that the discussion on ambient benzene and toluene concentrations found at the bottom of page 104 be expanded to include a statement to the effect that the State of Alaska's aromatic hydrocarbon criterion has been applied specifically to continuous discharges, such as Upper Cook Inlet and Port Valdez, to evaluate chronic, potentially sublethal levels of hydrocarbons in these water bodies. The Department of Environmental Conservation does not anticipate lethal levels being present. The analysis of aromatic hydrocarbons in all cases has included a measure of the twelve most water soluble isomers, such that, in addition to benzene and toluene (both very volatile), xylene, napthalene, dimethylnapthalenes, methylnapthalene, and trimethylbenzenes have been included in the analysis. The State recognizes the volatility of benzene and toluene and thus has emphasized the use of a series of more complex (and less volatile) aromatics (e.g. napthalenes) as the most useful tracers of water and sediment quality.

Page 105 (top paragraph). The sentence should correctly read: "Assuming an LD 50 effect at 1 ppm, . . . 0.01 of this value (or 10ppb). . "

The fact that toxicity of aromatics is generally inversely proportional to solubility of the compound is important in the context of the discussion on benzene and toluene, two of the more highly soluble (and consequently, less toxic) aromatic compounds.

We recommend adding the following paragraph to the last paragraph on page 104.

Investigators have also shown that more complex monoaromatic and diaromatic compounds play a larger role in toxicity than do benzene and toluene and that toxicity is inversely proportional to solubility. This means that compounds in low concentrations may have significant effects on sensitive organisms. Since these compounds are less volatile and, therefore, have a longer residence time, their influence is also greater.

P. 123 Although oil spills associated with OCS oil production are discussed in the draft EIS, blowouts and operational spills that occur from exploratory activities are not considered. This is a major oversight and should be corrected since the potential exists for extremely large oil spills, such as the recent mexican OCS blowout, to occur in the exploratory phase of oil and gas development. In addition to blowouts, there is scientific evidence to suggest that the small chronic operational spills may create long term effects on the environment. As a result, this type of oil spill should also be examined in the draft EIS.

Although the oil spill trajectory analysis goes into some detail about launch sites, impact points and arrival times, the size of the spill is not defined. The amount of oil spilled can be the determining factor in the time it takes to reach shoreline areas and the impact that it causes at these locations. Therefore, the spill size should be discussed, especially when the modified leasing proposals (Figs. IV. A.1.d.-19, 20, 21) are based on deleting those tracts that pose significant risks to the shoreline of Lower Cook Inlet - Shelikof Strait. It is important that the trajectory analysis utilize spill sizes that can reasonably be expected to occur as a result of an offshore accident and be based, to the maximum extent possible, on historical spill data from oil and gas activity on the OCS.

P. 153 The draft EIS does not connect the fact that the areas of highest probable impact from oil spills along the west coast of the Kodiak archepelago are also the most important areas for herring spawning.

P. 158 The draft EIS does not note that the proposed oil pipeline through Kupreanof Strait traverses an important king crab breeding area.

In contrast to the statement "that tainting of fish must not be a notable happening, because there is seldom a report about it," there actually is a fair amount of information on tainting and a fairly comprehensive bibliography is contained in the ADF&G report Recommendations for Minimizing the Impacts of Hydrocarbon Development on the Fish, Wildlife, and Aquatic Plant Resources of Lower Cook Inlet. It is not surprising that there is little information on tainting in Alaska waters because 1) very little fishing occurs in the area where oil development has occurred, 2) areas where major spills have occurred, such as the Coast Guard facility at Kodiak, have been closed to harvest, and 3) unless badly oiled there is no way of determining if a fisheries product has been tainted without eating it.

P. 169 Tracts have been identified as providing 75-85 percent of the total king and tanner crab harvest in Lower Cook Inlet. Because of the restricted area involved and the heavy gear concentrations, significant conflicts between support vessels and fixed fishing gear could occur during the exploration and development phases of lease operations.

P. 170 The conclusion that "the proposed sale would have little or no effect on the Kodiak, Homer, Port Lions, Seldovia, and Kenai commercial fisheries" does not follow the information provided above which describes fairly serious impacts on the commercial fisheries under some scenarios.

The argument that "experience from other areas (Yakutat and Cook Inlet) have shown over time (2-5 years) these conflicts can be resolved" does not account for the fact that there has been little OCS exploration and no development, production, or transportation in either of these federal lease sale areas.

P. 175 The cumulative impacts scenario fails to consider 1) the impacts of federal leasing in other OCS areas on species which may be found in several OCS areas seasonally, and 2) the fact that oil and gas produced in other OCS areas may be transported into Cook Inlet for processing.

P. 189 "Thus it can be concluded that at least one beluga wintering area may be vulnerable to effects of spills from the proposal. However, the extent of ultimate effect of spills on beluga whales are unclear but most likely would be related to temporary or long-term reduction of food supplies due to mortality or decreased productivity of fish which may be present in the area, or possible avoidance by whales of affected areas."

There is evidence to suggest that the beluga whale population inhabiting the proposed lease area may be isolated and genetically distinct from other belugas. A small, isolated population such as this, which may be genetically different from other belugas, has the potential for being severely impacted by OCS activities. The Department of Fish and Game feels that we do not have sufficient information on the beluga population to realistically predict possible impacts. OCSEAP has not vigorously pursued basic research on the Cook Inlet beluga whale population. Thus, we cannot support the conclusions reached in the draft EIS that OCS activities will have little impact on these whales.

III. Graphics and Captions

Graphic #1. These comments apply to the reverse side of this graphic, p. 1 of 5, and are keyed to the draft EIS.

Part III.A.1 This section, Environmental Geology, covers much material, but in an erratic fashion and with little emphasis on the recently added Shelikof Strait segment.

The text appears to have been assembled from various segments, producing a highly detailed picture of certain facets like the well-studied volcanoes of Cook Inlet proper, but with no mention of the active Katmai volcanic complex which borders much of Shelikof Strait. The concepts of large scale crustal plate tectonics get good coverage, but pragmatic detail of relevance to petroleum exploration such as the location and degree of activity of contemporary shallow faults could be added to advantage. As it happens, substantial research is being done by work is presently being analyzed and should be available before the final EIS. This research on sea floor hazards in Shelikof Strait is by Monty Hampton of the U.S. Geological Survey, OCSEAP Research Unit #327.

Part III.A.1.a Last paragraph. "In the Katmai area ...seismic activity has been identified by Pulpan and Kienle (1979)." This is misleading, for these geologists have also recorded considerable seismic activity throughout the Cook Inlet, Shelikof Strait, and Kodiak areas, as region west of Katmai. It would be clearer to simply characterize the entire lease area as one of considerable seismicity.

Part III.A.1.b First paragraph. This section conveys the impression that there is a possible prospective section in the Lower Cook Region of some 44,000 feet (over eight miles). At any given site in the area, however, there does not appear to be half this thickness of sediments, much of it unprospective for oil or gas.

Part III.A.1.b Second through fourth paragraphs. The discussion of tectonics moves from mega- to micro-scale without mentioning a critical point, that Cook Inlet proper and Shelikof Strait are major grabens which have experienced considerable subsidence (presumably accompanied by major earthquakes) throughout the Tertiary and part of the Mesozoic. There was significant subsidence in much of the area during the 1964 quake.

Graphic I. Two of the major volcanoes of the region, Mts. Redoubt and Douglas, are omitted. In the legend, the figure indicating "syncline" is incomplete. The symbols for bottom sediment boundary, synclines, and anticlines appear identical on the graphic.

Graphic #2. Part III.A.2 Much of this section appears to have become transposed. Even when reordered, however, the discussion could be made much clearer. As is, the graphic shows a reasonable interpretation of generalized circulation, but the text discussion does not make clear the severe limitations or even the actual sources of the information. One particularly important point unmentioned is the pronounced seasonality of the region, dominated in the summer by the movement of air masses from the Gulf of Alaska, and in the winter by flow from the Interior. In other words, flushing of the region by wind action is accelerated in the winter, retarded in the summer. The discussion of "sea ice" is confusing and does not make clear that most floating ice in Cook Inlet is actually freshwater ice, formed at the mouths of the upper Inlet rivers, and not true sea ice. Such ice is only a serious problem when floes build up as sandwiches on the tide flats of the upper Inlet.

Part III.B.1 The text does not clarify the information presented in the graphic. Considerable space is devoted to the (important and vulnerable) shallow water banks, which are not indicated on the graphic. There is no definition in the text or graphic of the simplified coastal vulnerability classification used.

Graphic #2. Razor clams are found on more beaches of Kamishak Bay than are illustrated. Although no commercial scallop fishery presently occurs in Lower Cook Inlet, scallops are to be found in notable numbers in specific areas of Kachemak Bay and in Kamishak Bay around Augustine Island.

This graphic should be revised to 1) include other vulnerable fish and wildlife habitats in addition to razor clams and scallops such as salt marshes, the waters around bird rookeries sea otter concentrations, and other clam beaches, or 2) contain all the coastal classification in Hayes' Coastal Vulnerability Index.

Vulnerable Habitat and Circulation. The discussion concerning Graphic No. 2 (III.A.2. Meteorological Conditions and Oceanography) needs considerable editing.

Parts of the "Circulation," "Winds and Storms," and "Skycover" sections were interposed during printing, and there are a variety of miscellaneous errors which should be evident during editing. Other comments include:

a. Skycover (Visibility): This section starts with the statement "Fog is the principal cause of reduced visibility, and is most common from December through February, and from November through March. In the Kodiak area, fog is most common from June through September..."

In the first sentence, "December through February" is included in "November through March." Since the first sentence presumably applies to both Cook Inlet and Shelikof Strait, the second sentence appears contradictory.

b. Under the section on Tides, Port Clarence is used as a tidal reference station. We are not aware of a Port Clarence at the entrance to Cook Inlet.

c. In the description of drift bottle trajectories, reference is made to release stations D,E,G,H, and N. However, these release locations are not specifically identified on the map inset (Figure III. A.2.b.-1).

d. The section on Petroleum Hydrocarbons in Water Column states, "Surface tows were made at twenty Cook Inlet stations for the collection of floating tar. Only one station had measurable amounts of tar (0.1 mg)."

ADF&G's 1978 drift bottle study suggested a significantly greater amount of tar in the Inlet. Approximately 7 percent of drift bottle returns specifically indicated the bottles were coated with tar. Because this information was not requested, it can be anticipated that a significantly greater number of bottles were coated with tar but the fact was not reported. This finding was reported in the 1978 ADF&G report "Drift Bottle Studies in Lower Cook Inlet - 1978, Status Report #1, 31 October 1978."

Graphic #4. The halibut fishing areas depicted on map are not the "major" halibut fishing areas in Cook Inlet. The major halibut fishing areas are located in Kamishak Bay and the area south southeast of Augustine Island.

Graphic #5. Graphic 5 should highlight the "compass rose" area south southeast of Augustine Island (tracts 661, 662, 663, 704, 705, 706, 707, 748, 750, 751, 793, 794, 795, 836, 837, 838, 880, 881, 882, 883, 923, and 924) where 75-85 percent of the Cook Inlet king and tanner crab harvest occurs annually.

Graphic #6. A major dungeness crab fishing and reproduction area off Bluff Point is not illustrated.

Graphic #7. The major tanner crab catch area designation does not cover the area north and east of Augustine Island to its fullest extent.

Graphic #9. Kalgin Island is not a moose concentration area. Current estimates are that there are less than 8 moose left on the island. Other areas in Chinitna Bay and Kamishak Bay have higher density moose population, but are not shown on the map.

Graphic #10. In paragraph two, "Uganishak Island" should be Ugaiuskah Island.

Captions. In the third paragraph, it is stated "Little information is available on bird concentrations in the Shelikof Strait; however, murres, seaducks, and other wintering birds probably move from the inner bays to offshore feeding areas while nesting species congregate in the bays during spring."

Seaducks do not move to offshore feeding areas during the spring. Seaducks move onto breeding grounds or remain in shallow water near the coast.

In the seventh paragraph, it is stated, "On the Alaska Peninsula side of Shelikof Strait, no winter bird surveys have been made." The Department has winter bird survey data for a portion of the Alaska Peninsula side of Shelikof Strait and can furnish this information to BLM upon request. We feel that the above statement further underscores BLM's admitted lack of basic environmental data for the Shelikof Strait. We suggest that BLM attempt to calculate shoreline densities of waterfowl within the Shelikof lease area during various seasons so that a reasonably sound estimation of potential impacts can be made.

Paragraph 13 states, "Important staging areas are located at Kachemak Bay, Douglas River mud flats, Kenai River mud flats, Tuxedni Bay, the Drift River, Chinitna Bay, Iliamna Bay, Ursus Cove, and other areas in lower Cook Inlet."

Akumwarvik Bay, Fox River Flats, Kalgin Island, Bruin Bay, and all of Redoubt Bay north of Drift River should be indicated as important spring staging areas potentially affected by the proposed lease sale. In addition, the Big River area of Redoubt Bay has recently been found to be a critical nesting and molting habitat for tule geese.

Graphic #10. Seabird colonies in Kachemak Bay should be shown.

The Department of Fish and Game considers all of Kachemak Bay to be a "major known winter concentration area" for waterfowl. We suggest filling in the donut-shaped area on graphic 10. We also suggest designating Kachemak, Chiniak, Ugak, Uyak, and Kiluida Bays as "major spring/summer concentration areas."

The "high-use area" for waterfowl should extend throughout Kamishak Bay and Iniskin Bay.

Graphic #12. Aleutian Canada Goose

The most recent population estimate for Aleutian Canada goose is 1,600 birds not 1,150 as the caption implies.

Graphic #15. Although Graphic 10 shows the Kachemak Bay State Park, none of the State game sanctuaries or critical habitat areas in Lower Cook Inlet are shown. These include McNeil River State Game Sanctuary, Kalgin Island Critical Habitat Area, Kachemak Bay Critical Habitat Area, Fox River Flats Area, and Clam Gulch Critical Habitat Area. The McNeil River is probably the most well known brown bear viewing area in the world, and the Clam Gulch Critical Habitat Area is the most heavily used recreation area and largest sport fishery in the State.

III. Appendices

Appendix A

P.2 Production assumptions were based on all gas being associated. Gas production is estimated to continue one year after oil production ceased. This would not be possible with associated gas only.

P.4 The assumption that two production platforms could be in place by 1986 may be optimistic.

Appendix D

The Oil and Gas Conservation Commission believes oil spill probabilities to be unrealistically high. A review should include recent Cook Inlet data and data from US Geological Survey reports on oil spills, especially work done by Elmer P. Danenberger.

Footnote 4 Table A-5

One service well per four production wells is assumed. This is too high since secondary recovery is not considered (see page 23).

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I-Info

October 16, 1980

Ms. Esther C. Wunnicke, Manager
Alaska OCS Office
Bureau of Land Management
P. O. Box 1159
Anchorage, AK 99510

Dear Ms. Wunnicke:

Herewith is transmitted the Kodiak Island Borough's testimony on the BLM Draft Environmental Impact Statement for Oil and Gas Lease Sale No. 60, Lower Cook Inlet-Shelikof Strait. Our testimony consists of three parts.

The first section contains a written copy of our oral testimony presented in Homer, Kodiak and Anchorage, Alaska on October 14, 15, and 16 respectively. We are including a written copy of this testimony to also be considered as written testimony so that the issues raised and comments presented during the hearings will receive written responses in the Final Environmental Impact Statement for Lease Sale No. 60. The second section contains three position papers that include additional documentation supporting our oral presentations. The final section is a page-by-page review of the entire draft.

We hope this testimony will assist you in reaching a decision regarding the sale and help you in preparing the final statement which we look forward to receiving as soon as it is released. Please forward an additional copy of the FEIS to:

Dr. David T. Hoopes
R. W. Beck and Associates
Tower Building
7th Avenue at Olive Way
Seattle, WA 98101

Should you have any questions regarding our testimony, please contact me and I shall endeavor to see that they are answered.

Sincerely,

David Herrnsteen

KODIAK ISLAND BOROUGH

David Herrnsteen
Acting Mayor

DH:cb
Enclosures

ORAL TESTIMONY

OF

HANK PENNINGTON
KODIAK ISLAND BOROUGH
OCS ADVISORY COUNCIL

Presented at a Public Hearing
on the
DEIS for OCS Oil and Gas Lease Sale No. 60

held in Kodiak, Alaska
on
October 15, 1980

GOOD EVENING LADIES AND GENTLEMEN:

IN EARLIER PRESENTATIONS, YOU HAVE SEEN THAT KODIAK'S CONCERN OVER THE DEIS FOR LEASE SALE #60 CENTERS ON ITS FAILURE TO ADEQUATELY CONSIDER OR RECONCILE ONSHORE IMPACTS, ENVIRONMENTAL EFFECTS AND FISHING INDUSTRY CONFLICTS. IN MY COMMENTS, I WOULD LIKE TO FURTHER ELABORATE THOSE CONCERNS, PROVIDE ADDITIONAL INFORMATION FOR INCLUSION IN THE DRAFT, AND ENUMERATE STUDIES AND MITIGATING MEASURES THAT ARE NECESSARY FOR A REASONABLE DECISION TO PROCEED WITH THE SALE.

ONSHORE IMPACTS:

INCLUSION OF THE SHELIKOF STRAIT IN LEASE SALE #60 PROMISES SIGNIFICANT CHANGE FOR AT LEAST THE CITIES OF KODIAK, PORT LIONS, OUZINKIE, KARLUK AND LARSEN BAY AS WELL AS FOR PERSONS IN THE REGION WHO LIVE OUTSIDE THE INCORPORATED CITIES. THE DRAFT ACKNOWLEDGES THAT, WITH DEVELOPMENT OF OIL AND GAS, SOME DEGREE OF CHANGE WILL OCCUR AND IS UNAVOIDABLE. HOWEVER, THE DRAFT DOES NOT DEMONSTRATE ANY REASONABLE UNDERSTANDING FOR THE PEOPLE IN THESE ENVIRONS, AND THEREFORE IS NOT SUITABLE FOR ANTICIPATING SUCH CHANGE, ITS CHARACTERISTICS, OR ITS MAGNITUDE. SUCH INFORMATION IS CRITICAL IF THIS DRAFT IS TO SERVE ADEQUATELY AS A TOOL FOR MAKING A DECISION TO CONDUCT THE SALE.

THE FAILURE OF THIS DRAFT TO CONSIDER ANY ASSOCIATION BETWEEN LEASE SALE #60 AND OTHER PROPOSED LEASE SALES IN THE IMMEDIATE AREA, IN SPITE OF ACKNOWLEDGEMENT FROM THE OIL INDUSTRY THAT DEVELOPMENT OF ALL DISCOVERIES IN THE AREA WILL LIKELY SHARE COMMON FACILITIES GRAPHICALLY ILLUSTRATES THE INADEQUACY OF THIS DOCUMENT AS A DECISION MAKING TOOL. THE ABSENCE OF ANY SUCH EVALUATION OF CUMULATIVE OIL INDUSTRY ACTIVITIES MAKES REASONABLE PLANNING FOR OIL DEVELOPMENT BY LOCAL COMMUNITIES VIRTUALLY IMPOSSIBLE.

THE CURRENT KODIAK ISLAND BOROUGH OVERALL ECONOMIC DEVELOPMENT PLAN GIVES PRIORITY TO FISHERIES DEVELOPMENT OVER ALL OTHER FORMS OF DEVELOPMENT. BECAUSE THE DRAFT DOES NOT CONSIDER CUMULATIVE OIL DEVELOPMENT ACTIVITIES, IT IS VIRTUALLY IMPOSSIBLE TO ANTICIPATE THE NEEDS OF THE OIL INDUSTRY AND PLAN FOR THEM IN ASSOCIATION WITH THE FISHING INDUSTRY. THE MOST DIRECT MEANS OF PREVENTING ADVERSE INTERACTION IN THE PRESENT INFORMATION VACUUM IS TO RESTRICT OIL AND GAS FACILITIES TO LOCATIONS OFF THE ROAD SYSTEM AND AWAY FROM VILLAGES TO INSULATE THE FISHERIES INFRASTRUCTURE FROM UNDUE COMPETITION. IF SUCH A POLICY WERE ADOPTED, IT MIGHT WELL MEANT THAT THE ONLY LAND AVAILABLE TO OIL AND GAS DEVELOPMENT LIES WITHIN THE KODIAK NATIONAL WILDLIFE REFUGE, AN ENTITY THAT IS CURRENTLY RESISTING DEVELOPMENT OF AN ALTERNATIVE ENERGY PROJECT WHICH OVERLAPS ITS BOUNDARY.

ENVIRONMENTAL IMPACTS:

THE SHELIKOF STRAIT, AS IT IS PORTRAYED IN THE DRAFT, IS MOST NOTABLE FOR THE DEARTH OF BIOLOGICAL AND OCEANOGRAPHIC INFORMATION AVAILABLE. BECAUSE THE AREA WAS OVERLOOKED EARLY ON IN THE OCS LEASING PROGRAM, IT HAS NOT BEEN THE OBJECT OF STUDY UNDER THE OUTER CONTINENTAL SHELF ENVIRONMENTAL ASSESSMENT PROGRAM STUDIES, THE PRIMARY SOURCE OF FUNDS FOR THE COLLECTION OF BASELINE DATA FOR REGIONS SCHEDULED FOR POTENTIAL LEASING. IN THE DRAFT, IT IS THE OBJECT OF BROAD GENERALIZATIONS, ASSUMPTIONS, AND NEGLECT. IN FACT, FOR THE MOST PART, EVEN EXISTING DATA AND STATISTICAL SOURCES WERE NOT USED IN PREPARATION OF THE DRAFT.

IN THE FIRST SCOPING SESSION FOR LEASE SALE #60, THE KODIAK ISLAND BOROUGH OCS ADVISORY COUNCIL EXPRESSED ITS CONCERN FOR THE IMPACT OF RELEASED DRILLING MUDS, ESPECIALLY THOSE ON EGGS, LARVAE, AND JUVENILES OF COMMERCIAL AND NONCOMMERCIAL SPECIES IN THE SHELIKOF STRAIT. AT THAT TIME, THE DANGER OF THE MUDS WAS DOWNPLAYED, AND OUR RECOMMENDED MITIGATING MEASURES WERE GLOSSED OVER. IT WAS EXPLAINED THAT IT WAS NOT ECONOMICALLY FEASIBLE FOR THE OIL INDUSTRY TO ELIMINATE DUMPING ALL TOGETHER AND INSTITUTE SOME FORM OF ONSHORE DUMPING.

SUBSEQUENT RESEARCH BY THE OCS ADVISORY COUNCIL HAS REVEALED THAT DRILL MUDS CAN BE SEVERELY TOXIC. THE PUBLICATION "RECOMMENDATIONS FOR MINIMIZING THE IMPACTS OF HYDROCARBON DEVELOPMENT ON THE FISH, WILDLIFE, AND AQUATIC PLANT RESOURCES OF LOWER COOK INLET", PREPARED BY THE MARINE AND COASTAL HABITAT MANAGEMENT DIVISION OF THE ALASKA DEPARTMENT OF FISH AND GAME REPORTS THAT: "SIMPLE DRILLING MUDS WITHOUT ADDITIVES CAN BE CLASSIFIED AS LOW TO MODERATE TOXIC COMPOUNDS. THE ADVERSE EFFECTS WILL RESULT PRIMARILY FROM DISCHARGING MUDS INTO SHALLOW WATERS, WATER BODIES WITH LIMITED CIRCULATION OR MIXING, OR WATERS CONTAINING HIGH CONCENTRATIONS OF EGGS, LARVAE, OR SENSITIVE JUVENILE ADULT ORGANISMS. DRILLING MUDS WHICH CONTAIN HIGHLY TOXIC ADDITIVES TO DEAL WITH SPECIFIC DRILLING PROBLEMS ARE TOXIC UNDER ANY CIRCUMSTANCES."

THE REPORT DESCRIBES THE MOST COMMON COMPONENTS OF WATER-BASED DRILL MUDS AS BARITE, CAUSTIC SODA, BENTONITE CLAYS, AND LIGNOSULFATES. ADDITIVES FOR DEEP WELLS OR SPECIAL DRILLING PROBLEMS MAY INCLUDE SODIUM PENTACHLOROPHENATE, WHICH IS TOXIC TO MARINE LIFE AT CONCENTRATIONS OF 0.06 - 0.6 ppm, TRIVALENT CHROMIUM SALTS USED CONCURRENTLY WITH XC POLYMERS, WHICH ARE TOXIC TO MARINE LIFE IN CONCENTRATIONS OF 0.3 - 1 ppm, AND LUBRICATING AND CLEARING COMPOUNDS WHICH ARE TOXIC TO MARINE ORGANISMS IN CONCENTRATIONS RANGING FROM 14 TO 52 ppm.

INCLUDED FOR REFERENCE IS A TABLE SHOWING THE MONTHS OF THE YEAR WHEN MAJOR SPECIES IN THE LOWER COOK INLET REGION ARE MOST SENSITIVE TO DRILL MUDS AND CUTTINGS.

AN AREA OF MAJOR CONCERN TO THE RESIDENTS OF KODIAK IS THE OCEANOGRAPHY AND CIRCULATION OF THE SHELIKOF STRAIT AND LOWER COOK INLET, BOTH AS THEY AFFECT DISTRIBUTION OF SPILLED OIL AND AS THEY INFLUENCE THE LIFE HISTORIES OF MANY COMMERCIAL AND NONCOMMERCIAL SPECIES IN THE REGION.

THE MODELS USED TO PREDICT THE FATE OF SPILLED OIL IN LOWER COOK INLET ARE PREDICATED ON INFORMATION AVAILABLE FOR COOK INLET, WITH BROAD ASSUMPTIONS MADE FOR THE SHELIKOF STRAIT TO FILL A COMPLETE LACK OF DATA FOR THE REGION. WHILE THIS UNDERTAKING WAS IN PROGRESS, A SEPARATE EFFORT WAS MOUNTED BY THE NATIONAL ENVIRONMENTAL SATELLITE SERVICE TO USE ENHANCED INFRARED PHOTOGRAPHS TAKEN FROM SATELLITES TO MONITOR WATER MOVEMENTS THROUGH THE SHELIKOF STRAIT AND LOWER COOK INLET. THE RESULTS OF A YEAR AND A HALF OF OBSERVATIONS HAVE LED THE INVESTIGATORS TO REVISE MUCH OF THE POPULAR CONCEPTION OF WATER CIRCULATION IN THE NORTHERN GULF OF ALASKA, LOWER COOK INLET, AND SHELIKOF STRAIT. THEY ARE CURRENTLY PREPARING A PAPER ON THEIR FINDINGS FOR PUBLICATION IN PROFESSIONAL OCEANOGRAPHIC JOURNALS.

I HAVE INCLUDED WITH THIS TESTIMONY A COPY OF ONE OF THOSE ENHANCED INFRARED PHOTOGRAPHS FOR YOUR STUDY. IT ILLUSTRATES THE COMPLEXITY OF WATER TRANSPORT IN THE REGION, AND THE INADEQUACY OF THE MODELS GENERATED FOR EVALUATION OF THE FATE OF SPILLED OIL IN THE DRAFT ENVIRONMENTAL IMPACT STATEMENT.

A MAJOR FINDING OF THE STUDY WAS THE INFLUENCE OF THE ALASKA STREAM AND ITS SEASONAL VARIATIONS OF CIRCULATION IN THE SHELIKOF STRAIT AND LOWER COOK INLET. IN THE FALL, COINCIDENT WITH THE INCREASED FRESHWATER RUNOFF FROM COASTAL ALASKA, THERE IS UP TO A THREEFOLD INCREASE IN WATER VOLUME MOVING THROUGH THE REGION. IT IS SPECULATED BY MOST OF THE SCIENTISTS FAMILIAR WITH PHENOMENON AND WITH THE BIOLOGICAL COMMUNITIES OF THE REGION, THAT THE INCREASED CURRENT MAY SERVE AS THE MAJOR FLUSHING AGENT AND DISPURSAL MECHANISM FOR LARVAL AND JUVENILE ORGANISMS.

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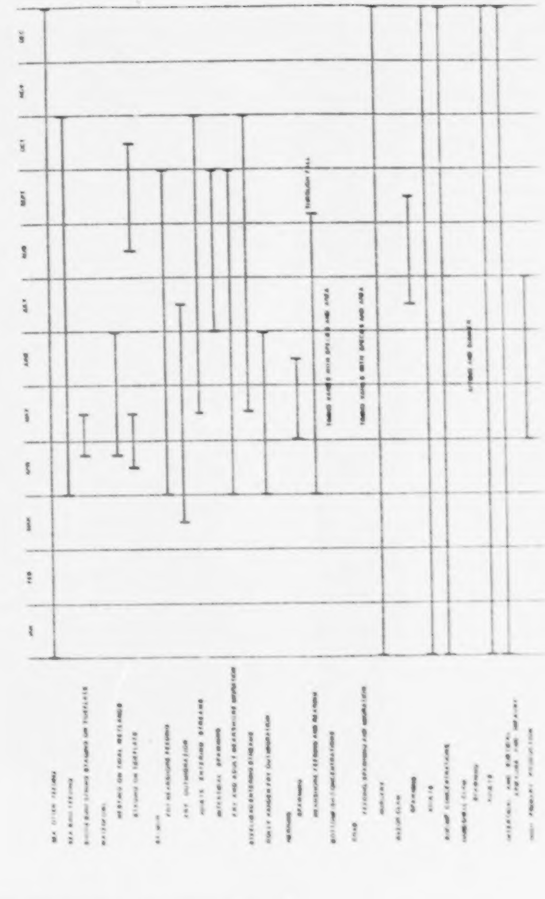
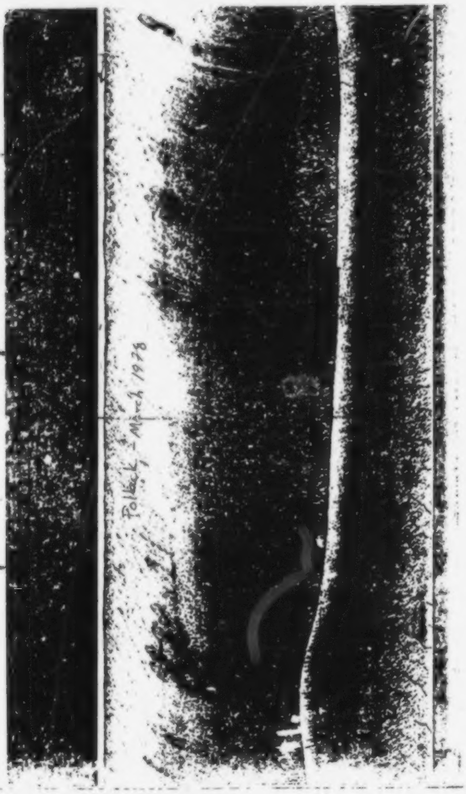
TABLE 6. MONTHS WHEN SPECIES IN COOK INLET ARE MOST SENSITIVE TO DRILLING MUDS AND CUTTINGS



IN THE CALL FOR NOMINATIONS FOR THE LOWER COOK INLET/SHELIKOF STRAIT LEASE SALE, THE ALASKA SHRIMP TRAWLERS ASSOCIATION SUBMITTED EVIDENCE OF MAJOR SPAWNING CONCENTRATIONS OF ALASKA POLLACK AND OTHER COMMERCIALLY IMPORTANT SPECIES OF BOTTOMFISH IN THE SHELIKOF STRAIT. THAT INFORMATION HAS NOT BEEN USED IN THE PREPARATION OF THIS DRAFT. FOR YOUR CONSIDERATION, A COPY OF A FATHOMETER RECORDING MADE OVER A PORTION OF THIS SCHOOL IS INCLUDED WITH THIS TESTIMONY. AT THE TIME THE RECORDING WAS MADE, THE SCHOOL OF POLLACK WAS OVER 90 MILES IN LENGTH, 10 MILES WIDE, AND OVER 30 FATHOMS THICK. COMMERCIAL CATCHES WERE RECORDED IN EXCESS OF 90,000 POUNDS PER HALF HOUR TOW.

SUBSEQUENT TO THE COLLECTION OF THAT INFORMATION AND ITS SUBMITTAL IN THE CALL FOR NOMINATIONS FOR LEASE SALE #60, THE NATIONAL MARINE FISHERIES SERVICE AND THE ALASKA DEPARTMENT OF FISH AND GAME CONDUCTED A SURVEY IN THE SHELIKOF STRAIT. THIS 1980 SURVEY ON THE VESSEL MILLER FREEMAN ONCE AGAIN LOCATED A SPAWNING CONCENTRATION OF POLLACK IN THE AREA, BUT THIS YEAR THE SCHOOL HAD DIMINISHED TO ONLY 20 MILES IN LENGTH AND SEVERAL MILES IN WIDTH.

TO VERIFY THAT THE CONCENTRATION OF POLLACK WAS INDEED SPAWNING, THE SCIENTISTS ABOARD THE MILLER FREEMAN LOWERED PLANKTON NETS TO TRY AND RECOVER EGGS. IT WAS THEIR OBSERVATION THAT THE NETS WERE RECOVERED "LOOKING LIKE BUCKETS OF CAVIAR". ANALYSES OF THOSE DATA ARE NOT COMPLETE AT THIS TIME, BUT PREVIOUS SURVEYS IN THE AREA SHOWED EGG CONCENTRATIONS IN EXCESS OF 10,000 EGGS PER SQUARE METER OF SURFACE AREA IN THE SHELIKOF STRAIT. WHILE BIOMASS ESTIMATES FOR THE SCHOOL OF POLLACK OBSERVED IN THE SHELIKOF STRAIT IN THE SPRING OF 1980 ARE NOT COMPLETED AT THIS TIME, ROUGH CALCULATIONS USING THE DATA SHOWED THAT THERE COULD HAVE BEEN AS MUCH AS ONE MILLION METRIC TONS OR OVER TWO BILLION POUNDS OF POLLACK PRESENT IN IN THE SHELIKOF STRAIT FOR SPAWNING AT THAT TIME. SINCE THIS MASS OF POLLACK IS GREATER THAN THE TOTAL ESTIMATED POLLACK BIOMASS FOR THE GULF OF ALASKA, IT IS LIKELY THAT THOSE ROUGH CALCULATIONS ERRED. IT IS ENTIRELY WITHIN REASON TO HYPOTHESIZE, HOWEVER, THAT THE SHELIKOF STRAIT MAY SERVE AS ONE OF THE MOST IMPORTANT SPAWNING GROUNDS, IF NOT THE MOST IMPORTANT SPAWNING GROUNDS FOR POLLACK IN THE GULF OF ALASKA. THIS HYPOTHESIS IS LENT FURTHER CREDENCE BY THE DISCOVERY OF THE THREE-FOLD INCREASE IN WATER VOLUME PASSING THROUGH THE SHELIKOF STRAIT IN THE FALL, WHICH WOULD SERVE


Pollock - March 1978

Honorable Mayor and Borough Assembly
February 20, 1979
Page 2

SPECIES	TIME PERIOD	TOTAL CATCH (lbs)	MEAN ANNUAL CATCH (lbs)	AVERAGE VALUE (1978 Dollars)	TOTAL VALUE (1978 Dolla
Tanner Crab	1969-1978	53,999,798	5,999,977.5	3,299,987 (@55¢/ lb)	29,699,888 (@55¢/lb)
King Crab	1969-1978	10,888,434	1,209,826	2,129,293 (@$1.76/lb)	19,163,643
Shrimp	1973-1978	33,852,000	5,597,000	923,505 (@16.5¢/lb)	5,541,030
Halibut	1973-1977	4,236,000	847,200	1,270,800 (@$1.50/lb)	6,354,000
Salmon	1975-1978	49,982,757	11,495,689	5,578,111	22,312,446
Dungeness Crab	1969-1978	2,904,481	322,720	225,904 (@70¢/lb)	2,033,136
Herring	1975-1978	2,270,000	567,500	113,500 (@20¢/lb)	454,000

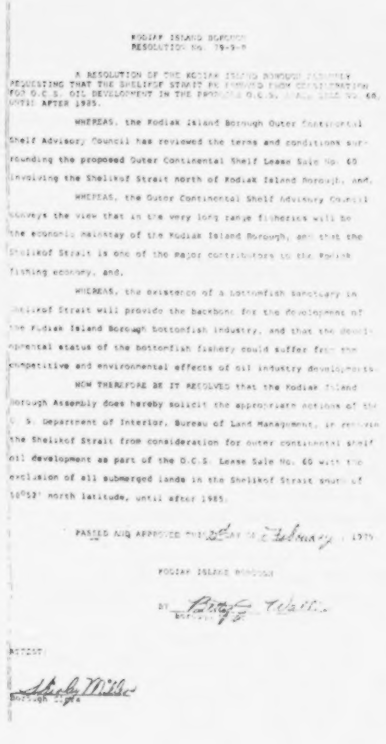
AS AN IMPORTANT DISPURSING MECHANISM FOR DISTRIBUTION OF THE JUVENILE POLLACK BACK INTO THE WESTERN GULF OF ALASKA. THIS PHENOMENEN IS NOT BEING STUDIED IN THE OCSEAP STUDIES, NOR IS IT EVEN CONSIDERED IN THE DRAFT EIS FOR PROPOSED LEASE SALE #60.

IN THE INTEREST OF KEEPING MY COMMENTS BRIEF, I WILL NOT COMMENT FURTHER ON THE ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTIONS. RATHER I WILL SUBMIT TO YOU A LIST OF STUDIES THAT WE FEEL ARE ABSOLUTELY ESSENTIAL BEFORE A RATIONAL DECISION CAN BE MADE TO CONDUCT THIS LEASE SALE.

FISHING INDUSTRY CONFLICTS:

IN THE TESTIMONY OF THE KODIAK ISLAND BOROUGH ON THE DEIS FOR THE PROPOSED FIVE YEAR LEASING SCHEDULE, ON THE DEIS FOR PROPOSED LEASE SALE #46, AND IN OUR SUBMISSIONS FOR THE CALL FOR NOMINATIONS FOR LEASE SALE #60, OUR CONCERNS OVER CONFLICTS BETWEEN THE FISHING INDUSTRY AND THE OIL INDUSTRY HAVE BEEN RESTATED AND ELABORATED REPEATEDLY. WHILE THE LETTER OF THE LAW DOES NOT REQUIRE THAT THOSE COMMENTS AND CONCERNS BE INCLUDED IN THE DRAFT EIS FOR LEASE SALE #60, IT WOULD SEEM THAT THIS INFORMATION WOULD SERVE AS A REASONABLE RESOURCE TO THE AGENCY PROPOSING THE LEASE SALE. IT IS NOW ENCUMBENT ON THE COMMUNITY TO REHASH THOSE CONCERNS AND INSIST THAT THEY BE ADDRESSED IN THE FINAL EIS FOR THE LEASE SALE.

ENCLOSED FOR YOUR CONSIDERATION IS A SUMMARY OF THE VALUE OF COMMERCIAL LANDINGS IN KODIAK FROM THE SHELIKOF STRAIT THROUGH 1978. THIS INFORMATION WAS ASSEMBLED BY THE OCS ADVISORY COUNCIL AS BACKGROUND FOR KODIAK ISLAND BOROUGH RESOLUTION NO. 79-9-R, WHICH ASKED THE BUREAU OF LAND MANAGEMENT TO DELETE THE SHELIKOF STRAIT FROM PROPOSED LEASE SALE NO. 60. THE INFORMATION IS READILY ACCESSIBLE FROM THE ALASKA DEPARTMENT OF FISH AND GAME, YET IT WAS NOT USED IN THE DRAFT, EITHER IN THE FORM PRESENTED BY THE ALASKA DEPARTMENT OF FISH AND GAME OR IN THE FORM PREPARED BY THE KODIAK ISLAND BOROUGH OCS ADVISORY COUNCIL. IN SUMMARY OF THE CHART BEFORE YOU, THE AVERAGE ANNUAL CONTRIBUTION OF THE SHELIKOF STRAIT FISHERIES TO KODIAK THROUGH 1978, EXPRESSED IN 1978 EXVESSEL DOLLARS, WAS $13,541,100.00. THIS FIGURE DOES NOT REFLECT LAST YEAR'S INCREASE IN THE HERRING FISHERIES, THE LANDINGS OF POLLACK AND COD IN 1979 AND 1980, AND THE INCREASED SALMON LANDINGS IN ~~1980.~~ NOR DOES IT CONSIDER LATENT POTENTIAL FOR EXPANSION OF THE BOTTOMFISH FISHERIES. ~~WHILE~~ AT THIS TIME WE ARE NOT LANDING BOTTOMFISH IN KODIAK, THE ORIGINAL BOTTOMFISH OPERATION IN GIBSON COVE HAS BEEN PURCHASED AND WILL BE


KODIAK ISLAND BOROUGH
RESOLUTION No. 79-9-R

A RESOLUTION OF THE KODIAK ISLAND BOROUGH ASSEMBLY REQUESTING THAT THE SHELIKOF STRAIT BE REMOVED FROM CONSIDERATION FOR O.C.S. OIL DEVELOPMENT IN THE PROPOSED O.C.S. LEASE SALE NO. 60, UNTIL AFTER 1985.

WHEREAS, the Kodiak Island Borough Outer Continental Shelf Advisory Council has reviewed the terms and conditions surrounding the proposed Outer Continental Shelf Lease Sale No. 60 involving the Shelikof Strait north of Kodiak Island Borough, and,

WHEREAS, the Outer Continental Shelf Advisory Council conveys the view that in the very long range fisheries will be the economic mainstay of the Kodiak Island Borough, and that the Shelikof Strait is one of the major contributors to the Kodiak fishing economy, and,

WHEREAS, the existence of a bottomfish sanctuary in Shelikof Strait will provide the backbone for the development of the Kodiak Island Borough bottomfish industry, and that the developmental status of the bottomfish fishery could suffer from the competitive and environmental effects of oil industry developments.

NOW THEREFORE BE IT RESOLVED that the Kodiak Island Borough Assembly does hereby solicit the appropriate actions of the U. S. Department of Interior, Bureau of Land Management, in removing the Shelikof Strait from consideration for outer continental shelf oil development as part of the O.C.S. Lease Sale No. 60 with the exclusion of all submerged lands in the Shelikof Strait south of 58°52' north latitude, until after 1985.

PASSED AND APPROVED THIS 2nd DAY OF February, 1979.

KODIAK ISLAND BOROUGH

BY Betty J. Wallin
Borough Mayor

ATTEST:

Shirley Miller
Borough Clerk

A. Birds

1. Surveys to assess summer and winter abundance and distribution of seabirds in Shelikof Strait and Kodiak Island Bays.
2. Surveys to assess seasonal abundance and distribution of waterfowl in Shelikof Strait and Kodiak Island Bays.
3. Studies to identify seabird colonies between Puale Bay and Cape Douglas on the north side of Shelikof Strait and between Malina Bay and Uganik Island on Kodiak Island.
4. Determine seasonal abundance, feeding distribution, and food habits of seabirds in Shelikof Strait colonies.
5. Conduct studies to determine sensitivity of nesting, feeding, and staging waterfowl and seabirds to noise and disturbance.

B. Marine Mammals

1. Conduct surveys to determine seasonal abundance and distribution of harbor seals, sea otters, and sea lions in Shelikof Strait. Determine feeding, pupping, and haulout areas.
2. Determine abundance and distribution of whales in Shelikof Strait.
3. Determine seasonal food habitats of sea lions, whales, and harbor seals. Determine relationship between seasonal demersal fish concentrations and marine mammal concentrations.
4. Determine seasonal movements of marine mammals in Shelikof Straits.
5. Conduct studies to determine sensitivity of sea lions, sea otters, seals, and whales, to noise and disturbance including submarine noises.

C. Fish

1. Determine abundance and distribution of demersal and pelagic fish in Shelikof Strait.
2. Determine abundance, distribution, and life history of large pollock schools found seasonally in Shelikof Strait.
3. Determine seasonal abundance and distribution of pelagic eggs larvae, and juveniles of demersal, and pelagic fish in Shelikof Strait.
4. Determine larval crustacean (king, tanner, dungeness crab, and shrimp) release areas and patterns of larval drift and development in Shelikof Strait.
5. Determine migrational patterns of adult and juvenile pelagic, demersal and anadromous fish in Shelikof Strait.

D. Human Use

1. Determine human use (recreational and subsistence) of fish and wildlife in Shelikof Strait region including;
   a. areas used, and
   b. species and quantities harvested.
2. Determine effect of increased population and competition for subsistence and recreational resources resulting from primary and secondary effects of offshore oil and gas exploration, development, and production.

OPERATED AFTER THE FIRST OF THE YEAR. INTERNATIONAL SEAFOODS HAS CONSTRUCTED WHAT MANY CONSIDER TO BE THE MOST ADVANCED BOTTOMFISH PROCESSING PLANT IN THE WESTERN HEMISPHERE IN KODIAK AND PLANS TO COMMENCE OPERATIONS ON OR BEFORE THE FIRST OF THE YEAR. IN ADDITION, AT LEAST THREE PROCESSING FIRMS ARE DEVELOPING PLANS FOR MAJOR BOTTOMFISH HAND FILLET OPERATIONS IN KODIAK IN THE IMMEDIATE FUTURE. AS IN THE PAST, IT IS ANTICIPATED THAT THE VAST BULK OF THE FISH FOR THOSE OPERATIONS WILL BE HARVESTED IN THE SHELIKOF STRAIT.

AS NOTED ON MANY OCCASIONS IN THE PAST, KODIAK IS VERY CONCERNED THAT OIL AND GAS DEVELOPMENT CONDUCTED ON KODIAK AT THIS TIME WOULD LEAD TO ADVERSE COMPETITION BETWEEN THE FISHING INDUSTRY AND THE OIL INDUSTRY FOR SEVERELY LIMITIED HARBOR AND WATERFRONT FACILITIES, THE SHORTAGE OF HOUSING, AND THE SHORTAGE OF SKILLED LAROBERS, SUCH AS DIESEL ENGINEERS, MACHINISTS, ELECTRICIANS, PLUMBERS, AND ELECTRONIC SPECIALISTS. WE ARE EQUALLY CONCERNED THAT ANY RAPID GROWTH ASSOCIATED WITH DEVELOPMENT PHASE OF OIL AND GAS DEVELOPMENT WOULD INFLATE HOUSING PRICES TO THE POINT THAT PROCESSING WORKERS COULD NOT COMPETE ON THEIR WAGE SCALE FOR ADEQUATE HOUSING.

IN CLOSING, I WOULD LIKE TO REITERATE THAT THE KODIAK ISLAND BOROUGH IS NOT OPPOSED TO OIL AND GAS DEVELOPMENT AS A MEANS OF DIVERSIFYING OUR ECONOMIC BASE. WE ARE CONCERNED, HOWEVER, THAT SUCH DEVELOPMENT, IF CONDUCTED AS PROPOSED AT THE PRESENT TIME BY THE BUREAU OF LAND MANAGEMENT IN AN ABSOLUTE INFORMATION VACUUM, COULD LEAD TO SACRIFICE OF LONG-TERM ECONOMIC HEALTH IN FAVOR OF SHORT-TERM GAINS FROM AN OIL BOOM. WE RECOMMEND THAT, DUE TO THE LACK OF REASONABLE INFORMATION ON THE SHELIKOF STRAIT, THE FAILURE OF BLM TO CONSIDER OTHER OIL AND GAS LEASING ACTIVITIES IN THE KODIAK REGION IN ASSOCIATION WITH LEASE SALE NO. 60, THE PROPOSED ACTION BE POSTPONED. IN THE INTERIM BETWEEN THE PRESENT AND THE RECONSIDERATION OF LEASE SALE NO. 60, WE RECOMMEND THAT THE STUDIES CONTAINED WITHIN THIS TESTIMONY BE CONDUCTED TO ALLOW ASSEMBLAGE OF REASONABLE INFORMATION ON WHICH TO BASE A DECISION TO CONDUCT THE SALE. WE FURTHER RECOMMEND THAT THE TIME PERIOD BE DEVOTED TO CONSIDERATION OF OTHER ALTERNATIVES THAN THOSE PRESENTED IN THIS DRAFT, PARTICULARLY AS THEY RELATE TO A COMBINATION OF LEASING ACTIVITIES AND TO THE INTERACTION OF INDIVIDUAL LEASE SALES AND THEIR CUMULATIVE EFFECTS.

IF IT IS DEEMED NECESSARY IN THE NATIONAL INTEREST THAT THE SLIGHT RESOURCE POTENTIAL IN THE AREA PROPOSED FOR LEASING BE IMMEDIATELY EXPLORED WITHOUT SUCH A DELAY, WE HAVE TO INSIST THAT THE SHELIKOF STRAIT BE REMOVED FROM CONSIDERATION FOR SALE. THE AREA TO BE REMOVED FROM THE SALE SHOULD INCLUDE ALL SUBMERGED LANDS SOUTH AND WEST OF A LINE DRAWN BETWEEN THE BARREN ISLANDS AND CAPE DOUGLAS, BUT INCLUDING TRACTS NORTH AND EAST OF THAT LINE AND DESIGNATED ON THE PROTRACTION DIAGRAMS AS NUMBERS 704, 661, 663, 748, 705, 706, 707, 750, 751, 836, 793, 794, 795, 880, 837, 838, 923, 924, 881, 882, 883, 968, 925, 1011, 1012, 1055, 1056, 43, 44, 88, 48, 131, 132 90, 91, AND 92. FURTHER, IF A COMMERCIAL DISCOVERY IS MADE, A DEVELOPMENTAL EIS MUST BE PREPARED BEFORE DEVELOPMENT CAN COMMENCE. WHATEVER THE CONFIGURATION OF THE SALE, WE FEEL THAT IT IS IN THE BEST INTEREST OF THE BIOLOGICAL COMMUNITIES AND THE HUMAN COMMUNITIES THAT THE FOLLOWING CONDITIONS AND MITIGATING MEASURES BE IN PLACE BEFORE THE LEASES ARE OFFERED FOR SALE:

DUE TO THE HIGH CONCENTRATION OF EGGS, LARVAE, AND JUVENILES OF COMMERCIAL AND NONCOMMERCIAL SPECIES IN THE LOWER COOK INLET/SHELIKOF STRAIT REGION FROM MARCH THROUGH OCTOBER, EITHER DRILLING OPERATIONS WILL BE RESTRICTED TO THE TO THE MONTHS OF NOVEMBER, DECEMBER, JANUARY AND FEBRUARY; OR, ALL DRILL MUD AND CUTTINGS MUST BE RETAINED FOR DISPOSAL ON LAND OR IN OVER 1000 FATHOMS OF WATER DOWN CURRENT AND OFFSHORE FROM KODIAK ISLAND IN THE MONTHS EXTENDING FROM MARCH THROUGH OCTOBER, INCLUSIVE.

FURTHER MITIGATING MEASURES AS PROPOSED BY THE STATE OF ALASKA APPEAR TO BE DRAFTED IN THE BEST INTEREST OF THE PEOPLE OF KODIAK AND THE ENVIRONMENT. I HAVE ATTACHED THOSE TO MY TESTIMONY FOR INCLUSION WITH MY TESTIMONY AND RECOMMEND THAT THEY BE ADOPTED AND IN PLACE BEFORE ANY LEASES ARE LET.

The mitigating measures referred to above have been deleted from this text. The reader is referred to the comments of the State of Alaska herein for the complete text on mitigating measures so cited.

KODIAK ISLAND BOROUGH

ORAL TESTIMONY

OF

LINDA L. FREED
CZM COORDINATOR
KODIAK ISLAND BOROUGH

PRESENTED AT THE PUBLIC HEARING
ON THE DEIS FOR
OIL AND GAS LEASE SALE NO. 60

HELD IN KODIAK, ALASKA
ON
OCTOBER 15, 1980

GOOD AFTERNOON. MY NAME IS LINDA FREED AND I REPRESENT THE KODIAK ISLAND BOROUGH AS THEIR COASTAL ZONE MANAGEMENT COORDINATOR. IT IS FROM THIS VIEWPOINT THAT I WOULD LIKE TO ADDRESS THE PANEL.

YOU HAVE ALREADY BEEN MADE AWARE OF THE KODIAK ISLAND BOROUGH'S POSITION ON LEASE SALE #60; ADOPTION OF THE DELAY OF SALE ALTERNATIVE. I WOULD LIKE TO SUPPORT THIS POSITION WITH A FEW COMMENTS ON THE COASTAL ZONE MANAGEMENT SECTION OF THE DEIS.

I WOULD LIKE TO PREFACE MY REMARKS BY NOTING THAT THE KODIAK ISLAND BOROUGH IS IN THE PROCESS OF ANNEXING LANDS ON THE ALASKA PENINSULA, THE WEST SIDE OF THE SHELIKOF STRAIT. IT IS THE BOROUGH'S CONCERN FOR CONSISTENT AND APPROPRIATE MANAGEMENT OF THIS IMPORTANT ALASKAN COASTAL AREA THAT HAS PROMPTED THE ANNEXATION PETITION.

AFTER CONSIDERABLE DELAY, THE KODIAK ISLAND BOROUGH IS NOW PROCEEDING WITH ITS COASTAL MANAGEMENT PLANNING EFFORT. OUR CONCERN WITH THE COASTAL ZONE MANAGEMENT SECTION OF THE DEIS, AND IN FACT LEASE SALE #60, STEMS FROM THIS EFFORT AT COMPREHENSIVE COASTAL RESOURCE PLANNING. OUR CONCERNS ARE TWO-FOLD:

FIRST, THE DEIS INDICATES THAT THE KODIAK ISLAND BOROUGH HAS COMPLETED STUDIES WHICH FORM THE BASIS FOR POLICIES RELATING TO OCS DEVELOPMENT AND FACILITY SITING. ALTHOUGH SUCH STUDIES HAVE BEEN COMPLETED, THEY HAVE NOT BEEN USED BY THE BOROUGH AS POLICY DOCUMENTS. IT IS INTENDED THAT THE STUDIES CITED IN THE DEIS WILL BE USED IN THE PREPARATION OF THE BROADER COASTAL MANAGEMENT PLAN. THIS PLAN WILL ADDRESS NOT ONLY OCS ACTIVITIES, BUT THE COMPATABILITY OF A VARIETY OF LAND USES AND ACTIVITIES IN THE KODIAK ISLAND BOROUGH'S COASTAL AREAS.

SECOND, IT IS STATED SEVERAL TIMES IN THE DEIS THAT THE PREVIOUSLY MENTIONED STUDIES ARE "ALL PREDICATED ON AWESTERN GULF OF ALASKS LEASE SALE RATHER THAN A SHELIKOF STRAIT LEASE SALE ". (PAGE 100) LITTLE OR NO PLANNING HAS BEEN DONE BY THE KODIAK ISLAND BOROUGH, OR ANY ONE ELSE THAT WE ARE AWARE OF, FOR THE COASTAL AREAS OF THE SHELIKOF STRAIT. THIS INADEQUACY WILL BE ADDRESSED IN THE DISTRICT COASTAL MANAGEMENT PLAN FOR THE KODIAK ISLAND BOROUGH.

IT IS FOR THESE TWO REASONS, AND THE OTHERS THAT HAVE BEEN AND HAVE YET TO BE PRESENTED, THAT I REITERATE THE KODIAK ISLAND BOROUGH'S SUPPORT FOR THE DELAY OF THE OCS OIL AND GAS LEASE SALE #60. AND THE BELIEF THAT IF THE SALE PROCEEDS THAT THE SHELIKOF STRAIT PORTION OF THE SALE MUST BE DELETED.

THANK YOU.

ORAL TESTIMONY

OF

THOMAS H. PETERSON
CHAIRMAN
KODIAK ISLAND BOROUGH OCS ADVISORY COUNCIL

PRESENTED AT A PUBLIC HEARING ON THE DEIS FOR
OIL AND GAS LEASE SALE NO. 60
LOWER COOK INLET/SHELIKOF STRAIT

KODIAK, ALASKA
OCTOBER 15, 1980

MADAM CHAIRWOMAN AND DISTINGUISHED HEARING PANEL MEMBERS, HELLO AGAIN. AS YOU KNOW, MY NAME IS TOM PETERSON, AND I AM CHAIRMAN OF THE KODIAK OCS ADVISORY COUNCIL. I AM BEFORE THE PANEL THIS AFTERNOON TO GIVE A DESCRIPTIVE ACCOUNT OF THE BOROUGH'S DUAL CONCEPT APPROACH IN ADDRESSING OUR POSITION REGARDING DELAYING LEASE SALE 60 THAT I MENTIONED BRIEFLY IN HOMER.

I ADDRESSED ONE REASON FOR DELAY OF SALE BY DESCRIBING THE FISHERIES RESOURCE CONCERNS OF THE KODIAK COMMUNITY. I WOULD LIKE TO HIGHLIGHT SOME ASTOUNDING FIGURES FOR FISH POPULATIONS IN SHELIKOF STRAIT AS DOCUMENTED BY THE ALASKA DEPARTMENT OF FISH AND GAME. THESE FIGURES ARE ALSO INCLUDED IN DR. HOOPES' POSITION PAPER ON FISHERY RESOURCES AND THE MARINE ENVIRONMENT TO BE SUBMITTED AS WRITTEN TESTIMONY TO THE OFFICE OF OCS/BLM.

THE PINK SALMON FISHERY YIELDS THE LARGEST SALMON HARVEST IN THE ENTIRE COOK INLET-SHELIKOF STRAIT REGION. THE KARLUK AND RED RIVERS HAD A RUN OF MORE THAN A MILLION FISH THROUGH THOSE WATERS IN 1978. RUNS OF OVER 5,000 SOCKEYE (RED) SALMON OCCUR YEARLY IN TWO RIVERS ON THE ALASKA PENINSULA SIDE OF SHELIKOF STRAIT. ON THE SHELIKOF STRAIT SIDE OF THE KODIAK ISLAND GROUP THERE ARE THIRTEEN STREAMS SUPPORTING RUNS OF SOCKEYE SALMON.

FROM 1969 TO 1975, THE ANNUAL CATCH OF KING CRAB FROM THE SHELIKOF STRAIT REGION COMPRISED 14 PERCENT OF THE ENTIRE GULF OF ALASKA'S HARVEST. CLOSE TO 22 PERCENT OF THE TOTAL GULF OF ALASKA'S TANNER CRAB HARVEST WAS CAUGHT IN THE SHELIKOF STRAIT. THE AVERAGE ANNUAL DUNGENESS CRAB CATCH FROM THE SAME REGION YIELDED APPROXIMATELY 18 PERCENT OF THE GULF TOTAL. IN THE YEARS FROM 1969 TO 1975, AN ANNUAL CATCH OF OVER 2,000 METRIC TONS OF PANDALID SHRIMP WAS HARVESTED FROM THE WATERS OF THE SHELIKOF STRAIT.

I HAD MENTIONED THE FACT, IN MY HOMER TESTIMONY, THAT THE BOROUGH HAD IN ITS POSSESSION A NATIONAL MARINE FISHERIES SERVICE (NOAA) CRUISE REPORT (NO. 80-1). DURING THIS CRUISE - FROM MARCH 12 to 28, 1980 - NMFS BIOLOGISTS ABOARD THE R/V MILLER FREEMAN DISCOVERED A CONTINUOUS CONCENTRATION OF SPAWNING WALLEYE POLLOCK VARYING FROM ONE TO SEVERAL MILES IN WIDTH AND EXTENDING FIFTY TO SEVENTY MILES THROUGH THE SHELIKOF STRAIT.

TO GIVE THIS PANEL SOMEWHAT OF AN IDEA OF THE COMMERCIAL VALUE OF THE FISHERY RESOURCE, I HAVE TAKEN THE LIBERTY OF APPLYING THE COMBINED WHOLESALE VALUE OF THE PRODUCTS LISTED IN THE ATTACHED LETTER TO THE KODIAK ISLAND BOROUGH ASSEMBLY FROM THE CHAIRMAN OF THE OCS COUNCIL. THIS LETTER REQUESTED THE ASSEMBLY TO ASK THAT SHELIKOF STRAIT BE REMOVED FROM CONSIDERATION FOR OCS OIL AND GAS DEVELOPMENT IN THIS PROPOSED LEASE SALE. THIS LETTER WAS DATED FEBRUARY 20, 1979. DURING THE PERIOD FROM 1969 TO 1978, THE TOTAL WHOLESALE VALUE FOR THOSE SPECIES LISTED WAS 227 MILLION DOLLARS. THIS FIGURE, I SHOULD ADD, DOES NOT INCLUDE GROUNDFISH.

GROUNDFISH LANDINGS FROM THE SHELIKOF STRAIT REGION HAVE GROWN FROM ABOUT 6 METRIC TONS IN 1975 TO 2,067 METRIC TONS THROUGH JULY OF 1979. THIS MONUMENTAL INCREASE GIVES SOUND SUPPORT TO OUR CONTENTION THAT THE DEVELOPMENT OF A GROUNDFISH INDUSTRY IS A REALITY IN THE COMMUNITY OF KODIAK.

THE FISHERIES RESOURCES OF THE COOK INLET/SHELIKOF STRAIT REGION RAISE MAJOR ISSUES WHEN VIEWED WITH REGARD TO OIL AND GAS RESOURCE DEVELOPMENT. THE BOROUGH HAS RECOGNIZED THE RISK POTENTIAL OIL AND GAS DEVELOPMENT CAN ENTAIL. THE TRADE-OFF IS NOT IN THE KODIAK COMMUNITY'S BEST INTEREST.

I HAD ASKED IN HOMER THAT THE DEPARTMENT OF THE INTERIOR, THROUGH ITS OFFICE OF OCS/BLM, RECOGNIZE THE CUMULATIVE IMPACT THAT SALES 60 AND 61 WILL HAVE ON THE KODIAK ARCHIPELAGO. THE COUNCIL AND BOROUGH ARE AGAIN REQUESTING THAT THIS DUAL APPROACH TO EVALUATING THESE TWO SALE AREAS BE ADOPTED. SO, PLEASE RECOGNIZE IT AS A REALISTIC APPROACH, AS WOULD THE OIL INDUSTRY.

ONE OF THE MAJOR REASONS THE BOROUGH HAS REQUESTED A DELAY IN SALE IS SO THAT THE CUMULATIVE IMPACTS OF LEASE SALES 60 AND 61 CAN BE ADDRESSED. THE POSSIBILITY THAT THE SECRETARY OF THE INTERIOR MAY NOT ADOPT THIS ALTERNATIVE HAS FORCED THE BOROUGH TO PROPOSE A SECOND CONCEPT, AS I MENTIONED AT THE BEGINNING OF THIS TESTIMONY.

THE BOROUGH, BASED UPON OCS COUNCIL RECOMMENDATIONS, PROPOSES THAT THE SECRETARY OF THE INTERIOR REMOVE ALL 80 BLOCKS WITHIN THE SHELIKOF STRAIT AREA FROM THE SALE. AS DR. HOOPES POINTED OUT IN HIS DISCUSSION OF CONCERNS RELATED TO THE OIL SPILL RISK ANALYSIS MODELS, THE BOROUGH FEELS STRONGLY THAT DEPENDING UPON THE NOW-QUESTIONABLE RISK ANALYSIS MODELS OF OIL SPILL CONTAMINATION COULD RESULT IN EXTREMELY DAMAGING EFFECTS TO THE SHELIKOF STRAIT ENVIRONMENT. THE 80 BLOCKS ALL LIE WITHIN THE SHELIKOF STRAIT AREA AS THE BOROUGH DEFINES THE STRAIT BOUNDARIES, NOT AS DEFINED IN THE DRAFT. THEY HAVE BEEN LISTED BY NUMBER IN WRITTEN TESTIMONY TO BE SUBMITTED BY THE BOROUGH.

OUR REQUEST FOR THESE BLOCK DELETIONS VARY SOMEWHAT FROM BLM'S ALTERNATIVES IV AND V. THIS PRESENT REQUEST REAFFIRMS A WRITTEN ONE SENT BY THE BOROUGH TO MR. FRANK GREGG, DIRECTOR OF BLM, FEBRUARY 27, 1979 AT THE REQUEST OF THE OCS COUNCIL. THIS LETTER IS ATTACHED TO MY TESTIMONY. I MAY POINT OUT THAT AT THAT TIME THE BOROUGH'S REQUEST WAS TURNED DOWN WITHOUT SO MUCH AS A REPLY OR EXPLANATION AS TO WHY IT WAS NOT ACCEPTED.

DR. HOOPES WILL CONVEY TO THIS HEARING PANEL A COMPENDIUM OF IRREGULARITIES FOUND DURING OUR REVIEW OF THE DEIS. HE HAS EXPLAINED IN DETAIL THE REASONS FOR THE POSITION TAKEN BY THE BOROUGH AND SUPPORTED BY THE OCS COUNCIL. THE POSSIBLE ADVERSE EFFECTS CASUSED BY OIL AND GAS DEVELOPMENT REPRESENT A TREMENDOUS RISK TO THE TOTAL INFRASTRUCTURE OF KODIAK ISLAND.

AS CHAIRMAN OF THE OCS ADVISORY COUNCIL, I STRONGLY SUPPORT THE DUAL CONCEPT APPROACH THAT DR. HOOPES AND I HAVE EXPLAINED HERE TODAY. IT IS CONSISTENT WITH THE BOROUGH'S LONG-STANDING CONCERNS OVER THE FATE OF THE SHELIKOF STRAIT AND ITS VULNERABILITY TO OIL AND GAS DEVELOPMENT.

THANK YOU, MADAM CHAIRWOMAN AND PANEL MEMBERS FOR RECEIVING MY ORAL COMMENTS.

KODIAK ISLAND BOROUGH

Telephones 486-5736 · 486-5737 — Box 1246
KODIAK, ALASKA 99615

RECEIVED
MAR 6 - 1979
POLICY DEVELOPMENT
& PLANNING

February 1979

Mr. Frank Gregg
Director
Bureau of Land Management
Attention: 720
Department of the Interior
Washington, D.C. 20240

Re: Kodiak Island Borough Assembly Action
Requesting that the Shelikof Strait be
removed from consideration for OCS Oil
Development in Proposed OCS Lease Sale
No. 60, until after 1985

Dear Mr. Gregg:

The Kodiak Island Borough Assembly, in conjunction with its Outer Continental Shelf Advisory Council, has reviewed the terms and conditions which surround the proposed Outer Continental Shelf Lease Sale No. 60 involving the Shelikof Strait north of Kodiak Island Borough. The consensus of our community conveys the view that in the very long range fisheries will continue to be the economic mainstay of the Kodiak Island Borough. Further, that the Shelikof Strait will be one of the major contributors to the developing bottomfish industry within the Kodiak fishing economy.

In the face of the above referenced realities, the Kodiak Island Borough Assembly hereby solicits and requests that the appropriate actions be taken by the U.S. Department of Interior, Bureau of Land Management, to remove the Shelikof Strait from consideration for Outer Continental Shelf oil development as part of the O.C.S. Lease Sale No. 60 through the process of excluding all submerged lands in the Shelikof Strait south of 50°52' north latitude, until after 1985.

Mr. Frank Gregg, Director
Bureau of Land Management
February 27, 1979
Page 2

A copy of Kodiak Island Borough Resolution No. 79-69-R setting forth the Assembly's actions requesting the removal of the Shelikof Strait from consideration is provided herewith for your additional information.

Sincerely,

S O Denslow

Stuart O. Denslow

Enclosure

cc: Mr. Robert Brock, Acting Manager, Alaska OCS Office, Anchorage

Mr. Rodney Smith, Area Oil & Gas Supervisor, U.S. Geological Survey, Anchorage

Mr. Bruce H. Baker, Office of the Governor, State of Alaska

Mr. Hank Pennington, Chairman, OCS Advisory Council

KODIAK ISLAND BOROUGH
RESOLUTION No. 79-9-R

A RESOLUTION OF THE KODIAK ISLAND BOROUGH ASSEMBLY REQUESTING THAT THE SHELIKOF STRAIT BE REMOVED FROM CONSIDERATION FOR O.C.S. OIL DEVELOPMENT IN THE PROPOSED O.C.S. LEASE SALE NO. 60 UNTIL AFTER 1985.

WHEREAS, the Kodiak Island Borough Outer Continental Shelf Advisory Council has reviewed the terms and conditions surrounding the proposed Outer Continental Shelf Lease Sale No. 60 involving the Shelikof Strait north of Kodiak Island Borough, and,

WHEREAS, the Outer Continental Shelf Advisory Council conveys the view that in the very long range fisheries will be the economic mainstay of the Kodiak Island Borough, and that the Shelikof Strait is one of the major contributors to the Kodiak fishing economy, and,

WHEREAS, the existence of a bottomfish sanctuary in Shelikof Strait will provide the backbone for the development of the Kodiak Island Borough bottomfish industry, and that the developmental status of the bottomfish fishery could suffer from the competitive and environmental effects of oil industry developments.

NOW THEREFORE BE IT RESOLVED that the Kodiak Island Borough Assembly does hereby solicit the appropriate actions of the U. S. Department of Interior, Bureau of Land Management, in removing the Shelikof Strait from consideration for outer continental shelf oil development as part of the O.C.S. Lease Sale No. 60 with the exclusion of all submerged lands in the Shelikof Strait south of 58°52' north latitude, until after 1985.

PASSED AND APPROVED THIS 21st DAY OF February, 1979

KODIAK ISLAND BOROUGH

BY Betty J. Wallin
Borough Mayor

ATTEST:

Sheila Miller
Borough Clerk

KODIAK ISLAND BOROUGH
OCS Advisory Council
Pouch O
Kodiak, Alaska 99615
Phone (907) 486-5451

February 20, 1979

Honorable Mayor and Borough Assembly
Kodiak Island Borough
P.O. Box 1246
Kodiak, Alaska 99615

Dear Mayor and Assembly:

The following actions are requested of the Borough Assembly by the OCS Advisory Council. These requests resulted from either the Council meeting on February 13, or from the joint meeting of the OCS Council and the Borough Assembly in the Borough Assembly work session on February 17.

1. By a unanimous vote, the OCS Advisory Council requests the following action of the Borough Assembly:

That a letter be drafted by the Assembly asking that the Shelikof Strait be removed from consideration for OCS oil development in the proposed OCS Lease Sale No. 60. The exclusion would include all submerged lands in the Shelikof Strait south of 58°52' latitude. We ask that this area be delayed from consideration for OCS leasing until after 1985, the beginning of the 1985-1990 scheduling period.

For background on the action we offer the following: The OCS Council feels that over the very long range, fisheries will be the economic mainstay of the Kodiak Island Borough. At present the Shelikof Strait is one of the major contributors to the Kodiak economy. In addition, for some years now, foreign fishing vessels have been forbidden to trawl for bottomfish in the Shelikof Strait, effectively creating a bottomfish sanctuary which will provide the backbone of the development of Kodiak's bottomfish industry. Due to the developmental status of that bottomfish fishery, the OCS Council felt that it, and the economy of Kodiak, would suffer from competition with the oil industry at this time.

We have accumulated the following fisheries statistics for existing fisheries in the Shelikof Strait:

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orable Mayor and Borough Assembly
ebruary 20, 1979
age 2

SPECIES	TIME PERIOD	TOTAL CATCH (lbs)	MEAN ANNUAL CATCH (lbs)	AVERAGE VALUE (1978 Dollars)	TOTAL VALUE (1978 Dolla
Tanner Crab	1969-1978	53,999,798	5,999,977.5	3,299,987 (@55¢/ lb)	29,699,889 (@55¢/lb)
King Crab	1969-1978	10,888,434	1,209,826	2,129,293 (@$1.76/lb)	19,163,643
Shrimp	1973-1978	33,852,000	5,597,000	923,505 (@16.5¢/lb)	5,541,030
Halibut	1973-1977	4,236,000	847,200	1,270,800 (@$1.50/lb)	6,354,000
Salmon	1975-1978	49,982,757	11,495,689	5,578,111	22,312,446
Dungeness Crab	1969-1978	2,904,481	322,720	225,904 (@70¢/lb)	2,033,136
Herring	1975-1978	2,270,000	567,500	113,500 (@20¢/lb)	454,000

2. At the time the Kodiak OCS Impact Study and the Marine Service Base Study were funded, the OCS Advisory Council was given verbal assurances by BLM and the oil companies that the Shelikof Strait was not being considered as a potential OCS Lease area. As a result, those studies do not consider the potential of OCS impact from those areas. We request that the Borough manager be directed to investigate sources of additional funding to update those studies to include the impact of the potential lease sale in the Shelikof Strait.

3. In viewing the combined workload resulting from Lease Sale No. 46 and Lease Sale No. 60, it is not possible for the OCS Council to fulfill its commitments without fulltime staff support, office space and professional planning assistance from the Borough. We have been inactive due to the delay in Lease Sale No. 46. With the possibility of both lease sales occurring within the near future, plus the strong potential for the major development of bottomfish fisheries around Kodiak, it is imperative that the OCS Council resume its technical studies, public education efforts and advisory function with the Borough Assembly immediately.

4. The OCS Council has received a preliminary proposal for a study of Development of Bottomfish Industry from a Danish consultant, Faroe Fishcon. Since the future of Kodiak will include both bottomfish and OCS oil development, the strong potential for conflict between the two industries must be evaluated and planned for. If the two are handled correctly, there is good potential that they can be compatible on shore. We feel that such a study should be authorized, but that the submitted proposal is weak. We recommend that an announcement be prepared, asking for similar proposals from other companies with expertise in the development of bottomfish fisheries.

5. At this time the National Marine Fisheries Service is conducting a series of public hearings regarding a proposed Fishermen's Contingency Fund for OCS-related gear losses, as outlined in the 1978 OCS Lands Act Amendments. We have reviewed the proposed regulations, and find them not to be in the best interests of the Kodiak fishing industry, and therefore, the economic health of Kodiak. We recommend that the Assembly draft a letter to the National Marine Fisheries Service commenting on the proposed action. As background, we submit a copy of the federal register outlining the proposed regulations, and a letter from the Alaska Shrimp Trawlers commenting on those regulations. After reviewing the regulations we recommend that the Borough support the position of the Shrimp Trawlers.

On behalf of the OCS Advisory Council and the entire Kodiak Island Borough community, we thank you for your understanding and commitments to these very important resource development issues and programs.

Sincerely,

Hank Pennington, Chairman
OCS Advisory Council

Enclosures

ORAL TESTIMONY
PUBLIC HEARING ON
DRAFT ENVIRONMENTAL IMPACT STATEMENT
FEDERAL OIL & GAS LEASE SALE #60
LOWER COOK INLET-SHELIKOF STRAIT

HOMER, ALASKA
OCTOBER 14, 1980

PREPARED BY:

THOMAS H. PETERSON
CHAIRMAN
KODIAK ISLAND BOROUGH
OCS ADVISORY COUNCIL

MADAM CHAIRWOMAN AND MEMBERS OF THE HEARING PANEL, GOOD AFTERNOON. MY NAME IS TOM PETERSON. I AM CHAIRMAN OF THE KODIAK ISLAND BOROUGH'S OCS ADVISORY COUNCIL. I AM HERE TO RENDER ORAL TESTIMONIAL SUPPORT TO THE BOROUGH'S POSITION CONCERNING FEDERAL OIL AND GAS LEASE SALE #60 FOR LOWER COOK INLET AND SHELIKOF STRAIT.

THE KODIAK ISLAND BOROUGH OCS ADVISORY COUNCIL IS A COLLECTIVE GROUP OF KODIAK CITIZENS WHO HAVE BEEN GIVEN AUTHORITY BY THE KODIAK ISLAND BOROUGH ASSEMBLY TO PROVIDE THE TECHNICAL STUDIES AND POLICY ADVISEMENTS IN ASSISTING THE ASSEMBLY TO TAKE ACTION CONCERNING OCS OIL AND GAS DEVELOPMENT IN AND AROUND KODIAK.

THE COUNCIL HAS SCRUTINIZED THE DRAFT ENVIRONMENTAL STATEMENT FOR LEASE SALE #60 WITH THE UPMOST DILIGENCE WITHIN A TIME FRAME THAT WAS INCREDIBLY LIMITED. AFTER THIS CAREFUL REVIEW OF THE DRAFT, THE COUNCIL RECOMMENDED TO THE ASSEMBLY TO ADOPT THE POSITION FOR DELAY OF SALE FOR THE FOLLOWING REASONS:

> THE MOST IMPORTANT REASON OF ALL IS THE KODIAK COMMUNITY'S CONCERN FOR THEIR FISHERY RESOURCES IN THE SHELIKOF STRAIT AREA. THE ABUNDANCE OF THE VARIOUS COMMERCIAL SPECIES OF FISH IN THE SHELIKOF ARE OF THE GREATEST IMPORTANCE WHEN ADDRESSING OIL AND GAS DEVELOPMENT WITHIN THE SAME BOUNDARIES.
>
> AS DR. HOOPES STATED IN HIS TESTIMONY TODAY, THE OCS COUNCIL'S INITIAL FEELINGS ON ALTERNATIVE IV AS A POSITION WERE THAT THE SHELIKOF STRAIT FISHERY RESOURCE WOULD BE LIMITED TO ADVERSE AFFECTS OF OIL AND GAS DEVELOPMENTS AS STATED IN THAT PARTICULAR SCENERIO. HOWEVER, AS DR. HOOPES POINTED OUT, THE INFORMATION THE BOROUGH HAS IN ITS POSSESSION CONCERNING THE OIL SPILL TRAJECTORY ANALYSIS MODELS WITHIN THE DRAFT DOES CONTEST THEIR ACCURACY AND CREDIBILITY TO A LARGE DEGREE.
>
> IT IS WITH THAT INFORMATION AND THE NEW ASSESSMENTS OF GROUND FISH RESOURCE POTENTIAL IN THE SHELIKOF STRAIT AS RECORDED BY THE NATIONAL MARINE FISHERIES SERVICE THAT HAS CONVINCED THIS OCS COUNCIL TO ADVOCATE A DELAY OF SALE UNTIL A MORE ACCURATE AND FORMIDABLE ADDRESSAL TO LEASING TRACT AREAS IN AND NEAR SHELIKOF STRAIT CAN BE FORMULATED BY THE OFFICE OF OCS/BLM.

IT HAS BEEN THE UNRELENTING POSITION OF THIS COUNCIL TO ADVOCATE THE RECOGNITION OF ACCUMULATIVE IMPACTS OF LEASE SALE #60 AND #46 (NOW LEASE SALE #61) BY THE DEPARTMENT OF INTERIOR SINCE THAT AGENCY'S INCEPTION OF THE AMBITIOUS OCS FIVE YEAR LEASE PLAN. THE OCS COUNCIL HAS ADDRESSED THIS REQUEST AT BOTH THE PUBLIC HEARING ON LEASE SALE #46 AND THE PROPOSED FIVE YEAR OIL AND GAS LEASING SCHEDULE AND NOW AGAIN FOR THIS PUBLIC HEARING ON LEASE SALE #60. IT IS THE COUNCIL'S AND BOROUGH'S ADAMANT REQUEST TO DELAY THIS SALE AND FUTURE ONES UNTIL THE ACCUMULATIVE AFFECTS OF SUCH SALES ARE SUFFICIENTLY ADDRESSED IN THE ENVIRONMENTAL IMPACT STATEMENT.

THE COUNCIL HAS BEEN AWARE FOR SOME TIME NOW, THROUGH CONVERSATIONS WITH OIL INDUSTRY OFFICIALS, THAT THEIR INDUSTRY WILL APPROACH THE KODIAK SALE AREAS WITH THE CONCEPT OF ADDRESSING CUMULATIVE ASPECTS OF OIL AND GAS DEVELOPMENT FOR COST EFFECTIVENESS AND BENEFICIAL PROFIT ADVANTAGE. THEREFORE, THIS COUNCIL WANTS THE OCS/BLM OFFICE TO BE COGNIZANT OF THAT FACT ALSO.

DR. HOOPES' WRITTEN POSITION PAPER FOR THE BOROUGH'S PROPOSED ALTERNATIVE AND HIS PAGE-BY-PAGE REVIEW THAT WILL BE SUBMITTED TO THE DEPARTMENT OF INTERIOR CLEARLY EXPOSES THE NUMEROUS INADEQUACIES THROUGHOUT THIS DRAFT. THE COUNCIL THOROUGHLY REVIEWED THESE AND CONCLUSIVELY FOUND THEM TO REFLECT THE OPINIONS OF THE COUNCIL CONCERNING THE SOMEWHAT BLATANT DISREGARD TO EFFECTIVELY WRITE A DEIS WRITTEN WITHIN NEPA GUIDELINES. THE COUNCIL'S RECOMMENDATION OF DELAY OF SALE TO THE BOROUGH FOR ADOPTION IS STRONGLY SUPPORTED BY DR. HOOPES' WRITTEN COMMENTS.

IN CONCLUDING THIS ORAL TESTIMONY, I WILL AGAIN REITERATE THE BOROUGH'S POSITION TO REQUEST A DELAY OF SALE FOR LEASE SALE #60 FOR THE SECRETARY OF INTERIOR TO CONSIDER. IF THIS REQUEST IS VIEWED UNFAVORABLY BY THE SECRETARY, THEN IT IS POINTED OUT TO THIS HEARING PANEL THAT THE BOROUGH HAS CONCEIVED A TRACT DELETION APPROACH TO THIS PROPOSED SALE THAT WILL BE EXPLAINED MORE FULLY THROUGH ORAL TESTIMONY AT THE PUBLIC HEARING IN KODIAK TOMORROW.

THANK YOU FOR THIS OPPORTUNITY TO LET ME EXPRESS THE KODIAK OCS ADVISORY COUNCIL'S VIEWS ON LEASE SALE #60.

ORAL TESTIMONY

of

Dr. David T. Hoopes
OCS Consultant
Kodiak Island Borough

Presented at a Public Hearing on the
DEIS for OCS Oil and Gas Lease Sale No. 60

held in Homer, Alaska

on
October 14, 1980

DISTINGUISHED PANEL MEMBERS, LADIES AND GENTLEMEN, GOOD AFTERNOON. MY NAME IS DAVID HOOPES. I AM HERE TODAY TO REPRESENT THE KODIAK ISLAND BOROUGH AS THEIR OCS CONSULTANT AND TO PRESENT ORAL TESTIMONY ON BEHALF OF THE BOROUGH.

OUR CONCERN HAS NEVER BEEN WHETHER OR NOT OFFSHORE OIL DEVELOPMENT WILL OCCUR BUT RATHER WHEN AND UNDER WHAT CONDITIONS. CONTROVERSY OVER OIL DEVELOPMENT ON THE KODIAK OCS STEMS FROM A NUMBER OF SPECIFIC CONCERNS. OUR OVERALL GOAL AS THE GOVERNING BODY RESPONSIBLE FOR ALL KODIAK ISLAND BOROUGH RESIDENTS HAS BEEN TO ENCOURAGE A GREATER PUBLIC VOICE IN ALL MATTERS AFFECTING OUR SHORELINES AND ADJACENT WATERS. DURING OUR REVIEW OF BLM/OCS OIL AND GAS LEASE SALE PROPOSALS, THREE SUBSTANTIVE ISSUES HAVE EMERGED AS FOCI FOR GENERAL PUBLIC CONCERN. THEY ARE: ONSHORE IMPACTS, ENVIRONMENTAL EFFECTS AND FISHING INDUSTRY CONFLICTS. EVEN THIS BREAKDOWN REPRESENTS AN OVERSIMPLIFICATION OF THE ISSUES INVOLVED BECAUSE EACH AREA OF CONCERN OVERLAPS TO A GREAT EXTENT WITH THE OTHERS.

IT WAS OUR FIRST INCLINATION, AFTER REVIEWING THIS DRAFT ENVIRONMENTAL STATEMENT, TO FAVOR SOME MODIFICATION OF BLM'S PROPOSED ALTERNATIVE IV. THIS ALTERNATIVE APPEARS TO OFFER SUBSTANTIAL REDUCTIONS IN RISK TO RESOURCES AND ENVIRONMENTAL VALUES OF PARTICULAR CONCERN TO KODIAK ISLAND RESIDENTS.

DELETION OF THE SHELIKOF STRAIT BLOCKS FROM THE PROPOSAL WOULD SIGNIFICANTLY REDUCE THE RISKS OF POTENTIAL OIL POLLUTION, CUMULATIVE DEVELOPMENT IMPACTS AND FISHERY CONFLICTS WITH REGARD TO A NUMBER OF MAJOR FISH AND SHELLFISH RESOURCES. REMOVAL OF THESE BLOCKS ALSO GREATLY REDUCES THE CUMULATIVE IMPACTS ASSOCIATED WITH OFFSHORE OIL DEVELOPMENT, ESPECIALLY THOSE IMPACTS THAT MIGHT AFFECT MARINE BIRDS. DELETION OF THESE BLOCKS WOULD SUBSTANTIALLY REDUCE THE RISK OF OILSPILLS AND RELATED EFFECTS TO MAJOR SEA OTTER AND OTHER MARINE MAMMAL HABITAT, PARTICULARLY IN THE NORTHERN KODIAK ARCHIPELAGO AND SHELIKOF STRAIT AREAS.

THE ELIMINATION OF A TANKER ROUTE THROUGH THE TREACHEROUS WATERS OF WHALE PASS GREATLY REDUCES THE RISKS TO IMPORTANT NEARBY MARINE AND COASTAL HABITAT. THE CHANCE OF POTENTIAL ADVERSE IMPACTS TO ENDANGERED CETACEANS ALSO FALLS SHARPLY. MAJOR ADVERSE IMPACTS TO THE COMMUNITY INFRASTRUCTURE OF PORT LIONS AND KODIAK WOULD ALSO BE ELIMINATED. IN SHORT, DELETION OF THE SHELIKOF STRAIT BLOCKS FROM LEASE SALE 60 WOULD MARKEDLY REDUCE THE UNAVOIDABLE ADVERSE EFFECTS OIL DEVELOPMENT COULD HAVE ON THE RESOURCES AND ENVIRONMENT UPON WHICH MOST OF THE AREA'S RESIDENTS DEPEND FOR COMMERCIAL GAIN AND SUBSISTENCE.

THE REDUCTION IN RISKS ASSOCIATED WITH VARIOUS BLOCK DELETIONS IS PREDICATED UPON THE DATA AND ASSUMPTIONS UNDERLYING THE MODELS USED FOR BLM'S OILSPILL RISK ANALYSIS. RECENT RESEARCH INFORMATION MADE AVAILABLE TO THE KODIAK ISLAND BOROUGH CASTS SERIOUS DOUBT ON THE ABILITY OF THESE MODELS TO DETERMINE SPILL TRAJECTORIES THAT ACCURATELY PREDICT THE SPEED AND DIRECTION OF OIL SPILLS OCCURRING WITHIN THE PROPOSED LEASE SALE AREA.

THERE ARE OTHER SERIOUS DEFICIENCIES IN THE DRAFT ENVIRONMENTAL STATEMENT FOR LEASE SALE 60 THAT HAVE INCREASED OUR RELUCTANCE TO SUPPORT ANY ALTERNATIVE INVOLVING DEVELOPMENT AT THIS TIME. OF MAJOR CONCERN IS THE FAILURE OF THE DOCUMENT TO ADEQUATELY ADDRESS ANY ALTERNATIVES TO THE PROPOSED ACTION OTHER THAN VARIOUS BLOCK DELETIONS. ANOTHER MAJOR DEFICIENCY IS BLM'S POINTED DECLINATION TO ADDRESS THE CUMULATIVE IMPACTS THIS PROPOSAL SHARES IN CONCERT WITH OTHER PROPOSED OCS LEASE SALES SCHEDULED FOR THE KODIAK AREA.

ASIDE FROM THE OBVIOUS DESIRABILITY OF PROTECTING THE RENEWABLE MARINE RESOURCES UPON WHICH OUR ECONOMY AND LIFESTYLES ARE IN LARGE PART BASED, WE SHARE A GENERAL CONCERN FOR THE WELL BEING OF ALL MEMBERS OF THE ECOLOGICAL COMMUNITY. WE HOLD THAT NO TECHNOLOGY IS WORTH RISKING THE REDUCTION OR IRREPLACEABLE LOSS OF ANY SPECIES; NOR HAVE SUCH LOSSES EVER PROVEN NECESSARY TO HUMAN SURVIVAL IN THE PAST. WE SHOULD NOT VIOLATE ENVIRONMENTAL LIFE SUPPORT SYSTEMS, OR EVEN ENVIRONMENTAL AMENITIES, FRIVOLOUSLY. WE CANNOT SUPPORT ENTERPRISES FOR WHICH NO OBVIOUS NET GAIN IN WELFARE FOR OUR ISLAND COMMUNITIES CAN BE DEMONSTRATED ---- ESPECIALLY THOSE ENTERPRISES THAT ARE, BY BLM'S OWN ADMISSION, CERTAIN TO HAVE DELETERIOUS ENVIRONMENTAL SIDE EFFECTS BASED ON THE 95 PERCENT PROBABILITY THAT AT LEAST FOUR MAJOR OIL SPILLS WILL OCCUR DURING THE LIFE OF THE SALE.

GIVEN THE UNCERTAINTIES INVOLVED WITH THE USGS OIL SPILL RISK ANALYSIS, THE MAJOR COMMERCIAL AND LATENT FISHERY RESOURCES INVOLVED, THE COMPLETE ABSENCE OF VIABLE SALE ALTERNATIVES AND THE TOTAL LACK OF CUMULATIVE IMPACT ASSESSMENT IN CONJUNCTION WITH OTHER PROPOSED OCS LEASE SALES IN ADJACENT AREAS, WE HAVE NO OTHER RECOURSE BUT TO REQUEST THAT LEASE SALE 60 BE DELAYED UNTIL SUCH TIME AS THESE MAJOR DEFICIENCIES ARE SATISFACTORILY RECTIFIED. SHOULD A DELAY IN SALE NOT BE FORTHCOMING, THEN WE CAN ONLY REAFFIRM OUR LONG-STANDING POSITION THAT OCS DEVELOPMENT BE PROHIBITED IN SHELIKOF STRAIT.

MADAM CHAIRMAN, IN CONSIDERATION OF THE LARGE NUMBER OF PERSONS WISHING TO TESTIFY HERE TODAY, I SHALL RELINQUISH THE REMAINDER

OF MY TIME AND CONTINUE MY PRESENTATION OF THE KODIAK ISLAND BOROUGH'S TESTIMONY WHEN THIS HEARING RECONVENES IN KODIAK TOMORROW AFTERNOON.

THANK YOU.

ORAL TESTIMONY

of

Dr. David T. Hoopes
OCS Consultant
Kodiak Island Borough

Presented at a Public Hearing on the
DEIS for OCS Oil and Gas Lease Sale No. 60

held in Kodiak, Alaska
on
October 15, 1980

DISTINGUISHED PANEL MEMBERS, LADIES AND GENTLEMEN,

GOOD AFTERNOON.

MY NAME IS DAVID HOOPES. I AM HERE TODAY TO REPRESENT THE KODIAK ISLAND BOROUGH AS THEIR OCS CONSULTANT AND TO PRESENT ORAL TESTIMONY ON BEHALF OF THE BOROUGH.

THE DEEP CONCERN WE HOLD FOR THE WELFARE OF OUR FISHING INDUSTRY PROMPTED THE BOROUGH ADMINISTRATION'S ADOPTION OF THE POSITION TOWARD LEASE SALE 60 THAT WE SHARED WITH YOU IN YESTERDAY'S ORAL TESTIMONY AT HOMER. WE DO NOT FEEL SECURE WITH THE CONCLUDING STATEMENT ON P. 170 OF THE DRAFT THAT THE PROPOSED SALE WOULD HAVE LITTLE OR NO EFFECT ON COMMERCIAL FISHERIES. THIS STATEMENT IS COMPLETELY AT ODDS WITH THE PROBABLE IMPACTS LISTED IN THE PRECEEDING PAGES.

ON P. 166 THE DRAFT STATES LOSSES TO RAZOR CLAMS COULD RESULT FROM THE PROPOSED ACTION. A "GOOD CHANCE THAT AT LEAST ONE POLLUTANT EVENT WILL ADVERSELY AFFECT SHRIMP POPULATIONS" IS NOTED ON P. 165. A PROBABLE REDUCTION IN CRAB POPULATIONS CAUSED BY EVENTS ASSOCIATED WITH THE PROPOSAL IS NOTED ON P. 163. AND ON P. 161 THE STATEMENT IS MADE THAT SALMON POPULATIONS COULD BE ADVERSELY AFFECTED. AGAIN, ON P. 170 THE CONCLUSION IS DRAWN THAT "THE PROPOSED SALE WOULD HAVE LITTLE OR NO EFFECT ON THE KODIAK, HOMER, PORT LIONS, SELDOVIA AND KENAI COMMERCIAL FISHERIES." YET, ON THE SAME PAGE, JUST FOUR PARAGRAPHS BELOW THIS STATEMENT, WE READ THAT:

"THE COMMERCIAL FISHING INDUSTRY WOULD EXPERIENCE ADVERSE IMPACTS FROM THIS PROPOSAL."

HOW CAN WE PUT ANY CREDENCE WHATSOEVER IN A DOCUMENT THAT FAILS TO MAINTAIN ANY SEMBLANCE OF INTERNAL INTEGRITY? HOW CAN A

DOCUMENT WITH SUCH GLARING INCONSISTENCIES BE USEFUL IN THE DECISION-MAKING PROCESS?

WHILE WE FULLY APPRECIATE THE UNQUANTIFIABLE NATURE OF MUCH OF THE INFORMATION NEEDED TO EVALUATE VARIOUS ALTERNATIVES, WE KNOW THAT CATCH AND EFFORT STATISTICS EXIST FOR REPORTING AREAS FALLING WITHIN CERTAIN RISK PROBABILITY ZONES. THUS, PROBABLE LOSSES TO FISHERY VALUES COULD BE ESTIMATED FROM DATA SUBMITTED TO BLM WITH RESOLUTION 79-9-R, DATED FEBRUARY 22, 1979, REQUESTING THAT SHELIKOF STRAIT BE STRICKEN FROM LEASE SALE 60. NOWHERE IN THE BODY OF THIS DRAFT, HOWEVER, IS THE VALUE OR MAGNITUDE OF THE SEVERAL COMMERCIAL FISHERIES EVEN MENTIONED, EXCEPT FOR AGGREGATED CATCH STATISTICS FOR RECENT YEARS FOUND IN TABLE III.B.2.c.-1 THROUGH 6 AND TABLE III.B.2.d.-1 THROUGH 6. THE VULNERABILITY OF VARIOUS SHORELINE HABITAT TYPES TO OIL SPILL IMPACTS HAS ALSO BEEN ASSESSED DURING THE OCSEAP PROGRAM BUT THESE DATA ARE NOT CORRELATED WITH SPILL TRAJECTORIES. THUS, THE RISK ANALYSIS DOES NOT BEGIN TO FULLY ASSESS IMPACTS TO EITHER FISHERY RESOURCES OR SHORELINE HABITATS.

OUR CONCERN OVER PROBABLE IMPACTS TO SHORELINE HABITATS IS FURTHER HEIGHTENED AS A RESULT OF ADDITIONAL RESPONSIBILITIES THAT MAY IN THE NEAR FUTURE REST WITH THE BOROUGH ADMINISTRATION. THE KODIAK ISLAND BOROUGH HAS RECENTLY APPLIED TO THE STATE OF ALASKA'S DEPARTMENT OF COMMUNITY AND REGIONAL AFFAIRS FOR PERMISSION TO ANNEX THE WEST SIDE OF SHELIKOF STRAIT FROM THE SOUTHERN BOUNDRY OF THE KENAI PENINSULA BOROUGH SOUTHWEST ALONG THE ALASKA PENINSULA TO A POINT IN THE VICINITY OF KUMLIK ISLAND. THE VULNERABILITY OF THIS COASTLINE TO OIL CONTAMINATION FROM A MAJOR SPILL, THEREFORE, WOULD BE OF PARTICULAR CONCERN TO US AS

THE LOCAL GOVERNMENTAL ENTITY RESPONSIBLE FOR THIS AREA.

SHORELINE HABITATS PLAY A PARTICULARLY SIGNIFICANT ROLE IN THE SUBSISTENCE LIFESTYLE OF MANY OF THE AREA'S RESIDENTS. ANY MAJOR DISRUPTION OF SUBSISTENCE OPPORTUNITIES OVER A LONG PERIOD OF TIME WOULD CREATE A SEVERE HARDSHIP ON ANY VILLAGE SO IMPACTED. THE FULL SIGNIFICANCE OF THE SUBSISTENCE LIFE STYLE IS LOST TO THE DOMINANT NON-NATIVE CULTURE. THE NATIVE AMERICAN'S VIEW OF LIFE IS ORIENTED TOWARD THE GROUP AS AN ORGANIC, ALL-EMBRACING BODY. A PERSON'S IDENTITY AS PART OF THE GROUP IS PART OF HIS OWN INDIVIDUALITY. HE IS THIS PERSON, AND PART OF HIM IS THE FACT THAT HE IS ATTACHED TO, BELONGS TO, IS PART OF, THIS PARTICULAR GROUP. HE BEHAVES AS AN INDIVIDUAL, TO BE SURE, BUT HE BEHAVES WITH REFERENCE TO HIS GROUP ATTACHMENT. IT IS AS AN ASPECT OF THE GROUP THAT SUBSISTENCE TAKES ON ITS SIGNIFICANCE, FOR THE SUBSISTENCE LIFE STYLE IS PART OF THE LIFE OF THE GROUP, AND SO IS PART OF WHAT AND WHO A PERSON IS. WITH THE DISAPPEARANCE OF THE OLD LANGUAGES AND OF MANY PRACTICES AND BELIEFS, AND WITH INCREASING USE OF GOODS FROM THE NON-NATIVE WORLD, THE CONTINUANCE OF A SUBSISTENCE TRADITION REMAINS A SOLID POINT OF IDENTIFICATION.

FISH, PARTICULARLY SALMON, AND OTHER MARINE FOODS ARE STILL AN INTEGRAL PART OF KONIAG LIFE. AS SOME OTHER ASPECTS OF THAT LIFE HAVE DISAPPEARED, THE ROLE OF FISH AND SUBSISTENCE FISHING HAS ASSUMED EVEN MORE IMPORTANCE --- BOTH ECONOMIC AND SYMBOLIC, AND THE SYMBOLIC MAY WELL BE THE MORE IMPORTANT OF THE TWO.

WE VIEW ANY THREAT TO THE SUBSISTENCE LIFE STYLE OF BOTH NATIVE AMERICANS AND NON-NATIVES ALIKE AS EXTREMELY SERIOUS AND WISH TO GO ON RECORD AS FAVORING ONLY THOSE ALTERNATIVES AND MEASURES THAT WILL EITHER REMOVE OR REDUCE SUCH THREATS TO AN ACCEPTABLE LEVEL.

THE WORST CASE ANALYSIS DESCRIBED IN THIS DRAFT ENVIRONMENTAL STATEMENT IS INADEQUATE ACCORDING TO CURRENT CEQ REGULATIONS (40 CFR 1502.22). WHILE THE BLM HAS PREPARED A WORST CASE ANALYSIS COVERING ENDANGERED CETACEANS (P. 281), SUCH AN ANALYSIS DOES NOT MEET CURRENT REGULATION STIPULATIONS BECAUSE IT ONLY CONSIDERS EFFECTS ON ENDANGERED WHALES. UNDER CURRENT CEQ REGULATIONS, HOWEVER, THE WORST CASE ANALYSIS MUST ALERT THE DECISION MAKER TO THE COSTS OF UNCERTAINTY BEYOND JUST ENDANGERED SPECIES.

THE DRAFT CORRECTLY NOTES (P. 160) THAT AN OIL SPILL EVENT REACHING THE SHORE COULD SERIOUSLY AFFECT PINK SLAMON POPULATIONS BECAUSE OF THE DISCRETENESS OF THE 2-YEAR CYCLIC NATURE OF THE GENETICALLY SEPARATE STOCKS. THE DRAFT INDICATES, HOWEVER, THAT RISK EXISTS ONLY DURING THE SHORT PERIOD OF TIME FRY ARE EMERGING FROM THE GRAVELS. THIS ASSUMPTION IS INVALID.

ON THE ALASKA PENINSULA AND IN THE KODIAK ARCHIPELAGO VIRTUALLY EVERY STREAM SUPPORTS RUNS OF INTERTIDAL SPAWNING PINK AND CHUM SALMON. ON KODIAK ISLAND THIS SPAWNING SUBSTRATE IS MORE IMPORTANT THAN IN OTHER AREAS. RIVERS HAVING THE LARGEST RUNS OF PINK AND CHUM SALMON CONTAIN THE HIGHEST PROPORTION OF INTERTIDAL SPAWNERS. CONSEQUENTLY, ANY SPILL THAT REACHES SHORE FROM THE TIME EGGS ARE DEPOSITED IN THE GRAVEL IN THE FALL TO AFTER FRY EMERGENCE AND OUTMIGRATION THE FOLLOWING SPRING COULD ADVERSELY AFFECT SIGNIFICANT NUMBERS OF INCUBATING EGGS OR ALEVINS.

THE DRAFT NOTES (P. 175) THAT A MAJOR SPILL (4 PREDICTED) COULD DIRECTLY KILL "PERHAPS SEVERAL HUNDRED THOUSAND BIRDS," GIVEN THE RIGHT SET OF CIRCUMSTANCES. THE IMPACT OF SUCH A LOSS UPON THE COASTAL ECOSYSTEM WOULD HAVE FAR-REACHING CONSEQUENCES.

MOST FEEDING FLOCKS OF MARINE BIRDS OCCUR WITHIN 5 KM. OF LAND. TWO OF THE THREE MAJOR PREY SPECIES ARE CAPELIN AND PACIFIC SAND LANCE. THESE TWO SPECIES OF FISH MAY AT TIMES HEAVILY POLLUTE COMMERCIAL SHRIMP CATCHES. THE MARINE BIRDS, HOWEVER, FEED IN THE NEARSHORE AREAS WHERE SHRIMP ARE ABUNDANT AND COMMERCIALLY FISHED, THUS THE BIRDS SERVE TO KEEP POPULATIONS OF THESE UNDESIRABLE FISH (FROM THE STANDPOINT OF THE SHRIMP FISHERMEN) UNDER CONTROL. ANY MAJOR DECLINE IN MARINE BIRD POPULATIONS COULD, THUS, INDIRECTLY AFFECT THE MARKET VALUE OF THE SHRIMP HARVEST.

THE IMPACTS OF A MAJOR OIL SPILL ON SALMON STOCKS, MARINE BIRDS AND OTHER FORMS OF MARINE AND COASTAL LIFE SHOULD BE ASSESSED UNDER THE "WORST CASE" SCENARIO TO ALERT DECISION MAKERS TO THE FAR-REACHING EFFECTS SUCH A SPILL MIGHT HAVE ON THE ENTIRE MARINE ECOSYSTEM.

AT THE BEGINNING OF 1980, LEASE SALE 60 RANKED 11TH OUT OF 15 PROPOSED SALES IN MEAN ESTIMATED RESOURCE AVAILABILITY (5-YEAR LEASE SALE SCHEDULE FES, P. 43). THE AREA PROPOSED FOR SALE WAS ESTIMATED TO CONTAIN 160 MILLION BARRELS OF OIL. THE MEAN ESTIMATE APPEARING IN THIS DRAFT, HOWEVER, PLACES TOTAL MEAN PRODUCTION AT AN ESTIMATED 670 MILLION BARRELS (TABLE II.B.1.a.-1). IT IS DIFFICULT TO KNOW WHETHER THIS INCREASE OF OVER 4-FOLD IS DUE TO NEW INFORMATION, THE ADDITION OF SHELIKOF STRAIT LEASE BLOCKS OR A COMBINATION OF BOTH. NO EXPLANATION IS OFFERED BY THE BLM TO ACCOUNT FOR THIS QUADRUPLING IN POTENTIAL PRODUCTION OVER A PERIOD OF JUST 8 MONTHS. THIS LATEST ESTIMATE WOULD RAISE LEASE SALE 60 FROM 11TH TO 6TH POSITION WITH REGARD TO POTENTIAL OIL PRODUCTION IF THE VALUES ESTIMATED FOR THE OTHER ALASKAN SALE AREAS REMAIN UNCHANGED FROM THOSE PRESENTED IN THE 5-YEAR

LEASE SALE SCHEDULE FES. THE BASIS FOR THIS HUGE INCREASE SHOULD BE THOROUGHLY DOCUMENTED IN THE FES FOR LEASE SALE 60.

WE NOTE, IN PASSING, THAT A RECENT GENERAL ACCOUNTING OFFICE STUDY SEVERELY CRITICIZED BLM FOR ALLEDGEDLY MANIPULATING PRODUCTION ESTIMATES TO ENHANCE SALE APPROVALS. A COMPLETE DOCUMENTATION OF THE REASONS BEHIND THE INCREASED ESTIMATES CITED HERE WOULD DISPELL ANY FEARS THAT SUCH MEASURES MIGHT HAVE BEEN EMPLOYED DURING PREPARATION OF THE DRAFT ENVIRONMENTAL STATEMENT FOR LEASE SALE 60.

WHILE OUR TESTIMONY SPECIFICALLY REFLECTS THE OFFICIAL BOROUGH ADMINISTRATION'S POSITION REGARDING LEASE SALE 60, WE HAVE RECEIVED A BROAD BASE OF SUPPORT AND INFORMATION FROM THE FISHING COMMUNITY. MANY FISHERMEN ARE PREVENTED FROM ATTENDING THESE HEARINGS BECAUSE BOTH SHRIMP AND KING CRAB FISHING SEASONS ARE IN FULL SWING. WE BELIEVE OUR TESTIMONY ACCURATELY REFLECTS THE FEELINGS OF THOSE WHO WILL BE MOST IMPACTED BUT WHO ARE UNABLE TO BE WITH US TODAY.

THE CONCERNS WE HAVE VOICED TODAY, COUPLED WITH OTHER DEFICIENCIES ALREADY CITED IN PREVIOUS TESTIMONY, HAVE LED US TO THE DECISION THAT LEASE SALE 60 SHOULD BE DELAYED UNTIL THE QUESTIONS WE HAVE RAISED ARE ANSWERED. IN THE EVENT THIS SALE PROCEEDS ON SCHEDULE DESPITE OUR REQUEST FOR A DELAY OF SALE, WE SHALL CONTINUE TO ADVOCATE THAT ALL SHELIKOF STRAIT BLOCKS BE DELETED FROM LEASE SALE 60.

THANK YOU.

ORAL TESTIMONY

of

Dr. David T. Hoopes
OCS Consultant
Kodiak Island Borough

Presented at a Public Hearing on the
DEIS for OCS Oil and Gas Lease Sale No. 60

held in Anchorage, Alaska
on
October 16, 1980

DISTINGUISHED PANEL MEMBERS, LADIES AND GENTLEMEN, GOOD MORNING. MY NAME IS DAVID HOOPES. I AM HERE TODAY TO REPRESENT THE KODIAK ISLAND BOROUGH AS THEIR OCS CONSULTANT AND TO PRESENT ORAL TESTIMONY ON BEHALF OF THE BOROUGH.

EARLIER BOROUGH TESTIMONY PRESENTED DURING THESE HEARINGS HAS DELT WITH THE BOROUGH'S POSITION REGARDING THIS PROPOSED SALE AND, IN A MORE GENERAL CONTEXT, WITH SOME OF OUR CONCERNS REGARDING DEFICIENCIES IN THE DRAFT ENVIRONMENTAL STATEMENT. WE SHALL TAKE THIS FINAL HEARING OPPORTUNITY TO FOCUS ON WHAT WE BELIEVE MAY BE SUBSTANTIAL AREAS OF NON-COMPLIANCE WITH FEDERAL ACTS AND REGULATIONS. PRINCIPAL AMONG THESE IS THE NATIONAL ENVIRONMENTAL POLICY ACT OF 1969 (NEPA) AND CURRENT COUNCIL ON ENVIRONMENTAL QUALITY (CEQ) REGULATIONS IMPLEMENTING NEPA PROCEDURES.

NEPA REQUIRES THAT AN EIS INCLUDE CONSIDERATION OF ALTERNATIVES TO A PROPOSED ACTION. THE RESPONSIBLE AGENCY MUST GO BEYOND SIMPLY ENUMERATING ALTERNATIVES AND DISCUSS THOSE ELEMENTS REQUIRED BY SECS. 102(2)(C)(i),(ii),(iv), AND (v) OF NEPA THAT ARE WITHIN THE SCOPE OF THIS STATEMENT. THE STATEMENT MUST INCLUDE A DISCUSSION OF AS MUCH OF SEC. 102(2)(C)(iii) AS IS NECESSARY TO THOROUGHLY ALERT THE REVIEWER TO ALL THE ENVIRONMENTAL CONSEQUENCES OF ALL REASONABLE ALTERNATIVES (NRDC v. CALLAWAY; NRDC v. MORTON).

NEPA REQUIRES THAT THE EIS INCLUDE INFORMATION SUFFICIENT TO PERMIT A REASONED CHOICE OF ALTERNATIVES SO FAR AS ENVIRONMENTAL ASPECTS ARE CONCERNED. IT IS CRUCIAL THAT THE EIS PROVIDE DECISION MAKERS WITH ENOUGH INFORMATION TO MAKE THAT REASONED CHOICE. THE DISCUSSION OF ALTERNATIVES HAS BEEN DESCRIBED AS "THE LINCHPIN OF THE ENTIRE IMPACT STATEMENT (ALASKA v. ANDRUS; MONROE COUNTY CONSERVATION COUNCIL, INC. v. VOLPE).

THIS DRAFT STATEMENT CONTAINS NO SUBSTANTIVE DISCUSSION OF ENERGY SOURCES ALTERNATIVE TO EXPLOITATION OF OCS LANDS PROPOSED BY THIS SALE. SPECIFICALLY, THERE IS NO MEANINGFUL DISCUSSION OF ALTERNATIVE SOURCES OF OIL AND GAS, PARTICULARLY SOURCES OFFERING LESSER CHANCES OF ENVIRONMENTAL DAMAGE. NOR ARE OTHER FOSSIL FUEL TECHNOLOGIES EXPLORED.

ALTERNATIVES OFFERED HERE ARE ONLY VARIATIONS OF A SINGLE PROPOSAL AND DO NOT ENCOMPASS A RANGE OF REASONABLE AND AVAILABLE ALTERNATIVES. THE NEED FOR AN EIS TO CLEARLY IDENTIFY DISTINCT ALTERNATIVES HAS BEEN EXPRESSED ON SEVERAL OCCASIONS (ALASKA v. ANDRUS; NRDC v. CALLAWAY; NONROE COUNTY CONSERVATION COUNCIL, INC. v. VOLPE; CALVERT CLIFFS' COORDINATING COMMITTEE v. AEC).

THE ALTERNATIVES SECTION OF THIS DRAFT FAILS TO ADEQUATELY ANALYZE THE NO ACTION ALTERNATIVE OR ALTERNATIVES OUTSIDE THE JURISDICTION AND CONTROL OF BLM.

CEQ REGULATIONS DIRECT THE RESPONSIBLE AGENCY TO:

"RIGOROUSLY EXPLORE AND OBJECTIVELY EVALUATE ALL REASONABLE ALTERNATIVES, AND FOR ALTERNATIVES WHICH WERE ELIMINATED FROM DETAILED STUDY, BRIEFLY DISCUSS THE REASONS FOR THEIR HAVING BEEN ELIMINATED."

"DEVOTE SUBSTANTIAL TREATMENT TO EACH ALTERNATIVE CONSIDERED IN DETAIL INCLUDING THE PROPOSED ACTION SO THAT REVIEWERS MAY EVALUATE THEIR COMPARATIVE MERITS."

"INCLUDE REASONABLE ALTERNATIVES NOT WITHIN THE JURISDICTION OF THE LEAD AGENCY."

THE EIS SHOULD INCLUDE SUFFICIENT ANALYSIS OF SUCH ALTERNATIVES AND THEIR COSTS AND ENVIRONMENTAL IMPACTS SO AS TO NOT PREMATURELY FORECLOSE OPTIONS THAT MIGHT HAVE LESS DETRIMENTAL EFFECTS. AN

ENVIRONMENTAL STATEMENT SHOULD DESCRIBE THESE ALTERNATIVES IN SUCH A MANNER THAT REVIEWERS CAN INDEPENDENTLY JUDGE IF THE ENVIRONMENTAL IMPACTS STEM FROM TRYING TO MAXIMIZE ECONOMIC RETURN OR ARE INHERENT TO THE ENTIRE PROJECT. THIS DESCRIPTION NOT ONLY REQUIRES COMPLETE ALTERNATIVES THAT WOULD ACCOMPLISH THE OBJECTIVE WITH LESS IMPACT, BUT ALSO SHOULD COVER NON-STRUCTURAL ALTERNATIVES AND THOSE THAT INCLUDE ELIMINATION OF "HIGH ENVIRONMENTAL IMPACT" ASPECTS OF THE PROPOSED ACTION.

THE RANGE OF IMPACTS THAT MUST BE CONSIDERED CANNOT BE LIMITED TO THE TRADITIONAL AREA OF AGENCY JURISDICTION OR EXPERTISE. THE STATEMENT MUST DEVELOP AN ENVIRONMENTAL AWARENESS FOR THE FULL RANGE OF IMPACTS INHERENT TO THE PROPOSED ACTION. BY FAILING TO DISCUSS REASONABLY FORESEEABLE ALTERNATIVES AND IMPACTS OR BY DISCUSSING THOSE ALTERNATIVES AND IMPACTS IN A PERFUNCTORY MANNER, AN AGENCY DEFEATS THE PURPOSE OF THE STATEMENT AND LAYS ITSELF OPEN TO THE CHARGE OF NON-COMPLIANCE WITH THE ACT (NRDC v. MORTON).

SEC. 1502.14(b) OF THE CEQ REGULATIONS SPECIFICALLY CHARGES THE LEAD AGENCY TO:

"DEVOTE SUBSTANTIAL TREATMENT TO EACH ALTERNATIVE CONSIDERED IN DETAIL INCLUDING THE PROPOSED ACTION SO THAT REVIEWERS MAY EVALUATE THEIR COMPARATIVE MERITS." THE STATEMENTS THAT IMPACTS ARE "REDUCED SUBSTANTIALLY" OR MODERATED BY AN "UNQUANTIFIABLE EXTENT" WITH ALTERNATIVES CONTRIBUTING ONLY AN "INDETERMINABLE INCREMENTAL RISK" HARDLY PROVIDE THE REVIEWER WITH THE EXACTNESS REQUIRED TO PLACE ALTERNATIVES IN PROPER PERSPECTIVE.

THE FOLLOWING PASSAGE CONFIRMS OUR CONTENTION THAT THE ALTERNATIVES PRESENTED IN THIS DEIS FAIL TO MEET THE INTENT OF NEPA AND THAT THIS DEIS DOES NOT CONFORM TO CURRENT CEQ REGULATIONS REGARDING THE

CONSIDERATION AND PRESENTATION OF ALTERNATIVE COURSES OF ACTION. WE QUOTE FROM P. 131, PARAGRAPH 3:

> "IN COMPARING THE DEVELOPMENT PHASE OF THE PROPOSAL WITH THOSE OF THE ALTERNATIVES, IT IS APPARENT THAT THE SCENARIOS FOR THE ALTERNATIVES ARE, FOR THE MOST PART, VARIATIONS ON THE SCENARIO ESTABLISHED FOR THE PROPOSAL. ALTERNATIVES IV AND V ARE ESSENTIALLY THE COOK INLET PORTIONS OF THE PROPOSAL'S SCENARIO. ALTERNATIVE VI IS ESSENTIALLY THE SOUTHERN HALF OF THE PROPOSAL BUT DIFFERS FROM IT IN THAT EXTRACTED GAS WILL BE REINJECTED INTO THE FORMATION. THE MAXIMUM CASE SCENARIO ... IS EXACTLY THAT OF THE PROPOSED ACTION."

WE CONTEND THAT THIS TOTALLY INADEQUATE TREATMENT OF ALTERNATIVES REPRESENTS A BLATANT CIRCUMVENTION OF THE INTENT OF NEPA AND CURRENT CEQ REGULATIONS AND RENDERS THIS DEIS BOTH TECHNICALLY AND SUBSTANTIVELY DEFICIENT.

IN ADDITION TO THE LOWER COOK INLET-SHELIKOF STRAIT LEASE SALE, OTHER SIGNIFICANT FEDERAL AND STATE ENERGY DEVELOPMENT PROJECTS ARE IN PROGRESS OR PLANNED FOR THE WESTERN GULF OF ALASKA REGION. PRINCIPLE AMONG THESE IS OCS LEASE SALE NO. 61 FOR WHICH NOMINATIONS ARE DUE IN NOVEMBER, 1980 AND A DEIS BY MARCH 1982, LESS THAN A YEAR AND A HALF FROM NOW. THESE DEVELOPMENTS TAKEN AS A WHOLE CAN BE EXPECTED TO HAVE SIGNIFICANT CUMULATIVE EFFECTS ON THE MARINE ENVIRONMENT SURROUNDING THE KODIAK ARCHIPELAGE FAR IN EXCESS OF THE IMPACT THAT WOULD BE EXPECTED FROM ANY ONE PROJECT STANDING ALONE. IF THERE ARE SEVERAL PROJECTS THAT WILL HAVE CUMULATIVE EFFECTS UPON A REGION SUCH THAT THE ENVIRONMENTAL CONSEQUENCES OF A PARTICULAR PROJECT CANNOT BE CONSIDERED IN ISOLATION, THE DECISION MAKER MUST BE ALERTED TO THOSE CUMULATIVE IMPACTS (KLEPPE v. SIERRA CLUB).

IN THIS DEIS, CONSIDERATION OF CUMULATIVE IMPACTS IS ESSENTIAL IF THE DECISION MAKER IS TO BE ALERTED TO REALISTIC POSSIBLE CONSEQUENCES OF THE PROPOSED ACTION. THE DISCUSSION MUST FURNISH SUCH INFORMATION AS APPEARS REASONABLY NECESSARY UNDER THE CIRCUMSTANCES FOR PROJECT EVALUATION (NRDC v. CALLAWAY). THE CUMULATIVE EFFECTS OF OTHER PROJECTS THAT CAN BE EXPECTED TO HAVE SIMILAR IMPACTS MUST BE ACKNOWLEDGED.

ON P. 127, PARAGRAPH 3, OF THE DRAFT THE STATEMENT IS MADE THAT THE DISCUSSION OF CUMULATIVE EFFECTS WILL BE BASED ON THE INTERRELATIONSHIP OF THE PROPOSED ACTION AND "OTHER MAJOR, CURRENT, AND PROPOSED PROJECTS." THE READER IS REFERRED TO SECTION IV.A.1.h. FOR A LIST OF PROJECTS CONSIDERED IN PREPARATION OF THE CUMULATIVE EFFECTS SECTION OF THIS DEIS. HERE, ON P. 148, SEC. h, WE FIND THE DRAFT LISTS OTHER MAJOR PROJECTS "WHICH MAY OCCUR, IN THE NEAR FUTURE, WITHIN OR CLOSE TO THE SALE AREA" THAT HAVE BEEN "CONSIDERED IN THE CUMULATIVE EFFECTS SECTIONS OF THIS DOCUMENT." WE FIND THAT WE MIGHT EXPECT CUMULATIVE EFFECTS FROM SUCH PROJECTS AS THE BELUGA COAL FIELD AND THE BRADLEY LAKE HYDROELECTRIC PROJECT BUT THAT THIS DEIS WILL NOT INCLUDE AN EVALUATION OF CUMULATIVE EFFECTS IN REGARD TO LEASE SALE 61! SALE 61 IS NOT INCLUDED BECAUSE:

> "FOR SUCH AN EVALUATION TO BE MADE, AT MINIMUM, THE ALASKA OCS OFFICE WOULD HAVE TO KNOW WHAT THE SALE 61 RESOURCE ESTIMATES WILL BE, WHAT THE AREAS OF PARTICULAR INTEREST WILL BE TO INDUSTRY, GOVERNMENT, AND SPECIAL INTEREST GROUPS, AND FINALLY, WHAT THE AREA SELECTED FOR FURTHER STUDY (e.g. THE PROPOSAL) WILL BE. AS NONE OF THIS INFORMATION IS PRESENTLY AVAILABLE, THERE IS NO BASIS ON WHICH TO MAKE AN ENVIRONMENTAL ASSESSMENT OF THE SALE 61 AREA; HENCE, NO VIABLE ASSESSMENT OF THE INTERRELATIONSHIP OF THE TWO SALES IS AT

> THIS MOMENT POSSIBLE."

A CUMULATIVE IMPACT IS DEFINED BY CEQ AS:

> "...THE IMPACT ON THE ENVIRONMENT WHICH RESULTS FROM THE INCREMENTAL IMPACT OF THE ACTION WHEN ADDED TO OTHER PAST, PRESENT, AND REASONABLY FORESEEABLE FUTURE ACTIONS REGARDLESS OF WHAT AGENCY (FEDERAL OR NON-FEDERAL) OR PERSON UNDERTAKES SUCH OTHER ACTIONS" (40 CFR 1508.7).

WE HOLD THAT A SUBSTANTIVE NEXUS EXISTS BETWEEN LEASE SALES 60 AND 61 IN RESPECT TO POTENTIAL CUMULATIVE IMPACTS THAT SIMPLY CANNOT BE IGNORED. DESPITE THE DECLARATION THAT NO CUMULATIVE EFFECTS CAN BE DETERMINED AT THIS TIME BETWEEN LEASE SALE 60 AND 61, CUMULATIVE EFFECTS OF THE TWO SALES ARE MENTIONED EITHER DIRECTLY OR INDIRECTLY ELSEWHERE IN THE TEXT OF THIS DEIS ON PP. 4, 18, 127, 170, 185, 199 AND 245.

WE BELIEVE THIS DEIS FAILS TO CONSIDER THE CUMULATIVE IMPACTS LEASE SALES 60 AND 61 WILL HAVE UPON THE NATURAL AND HUMAN ENVIRONMENTS OF KODIAK ISLAND. FURTHERMORE, STATING THAT AN EVALUATION OF CUMULATIVE EFFECTS WILL APPEAR IN THE DEIS FOR SALE 61 MEANS THAT THE BLM WILL ONLY CONSIDER THE CUMULATIVE EFFECTS OF THE TWO SALES AFTER A DECISION HAS ALREADY BEEN REACHED REGARDING THE FIRST, HARDLY THE TIME FOR LOOKING AT CUMULATIVE IMPACTS!

NOT MORE THAN 6 MONTHS AGO THE ALASKA OCS OFFICE HELD HEARINGS ON THE SECOND DEIS FOR THE AREA ENCOMPASSED BY THE NOW CANCELED SALE 46. MERELY CHANGING THE SALE NUMBER CANNOT CHANGE THE FACT THAT HUNDREDS OF HOURS AND THOUSANDS OF DOLLARS HAVE LITERALLY BEEN POURED INTO THE SALE 61 AREA IN A RESEARCH EFFORT THAT HAS SPANNED YEARS. IF WE DO NOT KNOW ENOUGH ABOUT THAT AREA TODAY TO ESTIMATE CUMULATIVE EFFECTS IN CONJUNCTION WITH LEASE SALE 60, HOW DID WE

KNOW ENOUGH ABOUT IT 6 MONTHS AGO TO PREPARE A DEIS FOR LEASE SALE 46?

WE SUBMIT THAT BLM HAS FAILED TO ASSESS ITS PROPOSED ACTION FOR ITS CUMULATIVE EFFECTS ON THE ENVIRONMENT IN DIRECT VIOLATION OF NEPA, SEC. 102(2)(C)(iv). WE FURTHER SUBMIT THAT THE BLM HAS, IN AN INTENTIONAL AND PREMEDITATED MANNER, AVOIDED ADDRESSING SUCH CUMULATIVE EFFECTS AND, FURTHER, IN DOING SO HAS RENDERED THIS DEIS BOTH DEFICIENT AND INADEQUATE.

ANY TREATMENT OF THE ENVIRONMENTAL CONSEQUENCES OF A PROPOSED ACTION MUST INCLUDE DISCUSSIONS OF THE ENERGY REQUIREMENTS AND CONSERVATION POTENTIAL OF VARIOUS ALTERNATIVES AND MITIGATION MEASURES (40 CFR 1502.16(e) OF THE CEQ REGULATIONS). SECTION 1502.16(f) CALLS FOR DISCUSSIONS OF THE NATURAL OR DEPLETABLE RESOURCE REQUIREMENTS AND CONSERVATION POTENTIAL OF VARIOUS ALTERNATIVES AND MITIGATION MEASURES AS WELL.

THE PARTICULAR ECONOMIC AND TECHNICAL BENEFITS OF ANY PLANNED ACTION MUST BE ASSESSED AND THEN WEIGHED AGAINST THE ENVIRONMENTAL COSTS; ALTERNATIVES MUST BE CONSIDERED THAT WOULD AFFECT THE BALANCE OF VALUES (CALVERT CLIFFS' COORDINATING COMMITTEE v. AEC). THIS DEIS CONTAINS NO SUCH ASSESSMENT AND IS, THEREFORE, DEFICIENT UNDER EXISTING CEQ REGULATIONS.

THE MIGRATORY BIRD TREATY ACT OF 1918 HAS BEEN HELD APPLICABLE TO NON-HUNTING COMMERCIAL PRACTICES, CREATING CRIMINAL LIABILITY FOR NEGLIGENT CONDUCT THAT CAUSES THE DEATH OF BIRDS (UNITED STATES v. CORBIN FARM SERVICES; UNITED STATES v. FMC CORPORATION). FROM THE DESCRIPTION OF POSSIBLE IMPACTS ON MARINE BIRD POPULATIONS, INCLUDING MIGRATORY WATERFOWL, FOUND ON PP. 170-176, WE MUST CONCLUDE THAT THE DEVELOPMENT OF OCS RESOURCES IN THE LOWER COOK

INLET/SHELIKOF STRAIT SALE AREA WOULD INEVITABLY RESULT IN VIOLATIONS OF THE MIGRATORY BIRD TREATY ACT.

THE CONCLUSION IS REACHED IN THE DRAFT EIS (P. 183) THAT OILSPILLS, NOISE AND DISTURBANCE ACCOMPANYING OCS DEVELOPMENT COULD RESULT IN "ACUTE" DIRECT OR INDIRECT EFFECTS ON MARINE MAMMALS. THIS DISCUSSION INDICATES THAT ACTIVITIES PROPOSED IN THIS DEIS CAN ALSO RESULT IN VIOLATIONS OF THE MARINE MAMMAL PROTECTION ACT OF 1972.

IN SUMMARY, IT IS OUR OPINION THAT THE DRAFT ENVIRONMENTAL STATEMENT FOR LEASE SALE 60 CONTAINS MAJOR DEFICIENCIES IN REGARD TO ITS COMPLIANCE WITH A NUMBER OF FEDERAL LAWS AND REGULATIONS. WE ARE HOPEFUL THAT THESE SHORTCOMINGS WILL BE ADEQUATELY ADDRESSED AND RECTIFIED IN THE FINAL ENVIRONMENTAL STATEMENT. WE BELIEVE THAT BRINGING THESE DEFICIENCIES TO YOUR ATTENTION AT THIS TIME MAY PRECLUDE THEIR BECOMING THE SUBJECT OF FURTHER DEBATE IN THE MONTHS AHEAD.

THANK YOU.

POSITION PAPER ON KODIAK ISLAND BOROUGH'S PROPOSED ALTERNATIVE

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OCTOBER 14, 1980

Position Paper on Kodiak Island Borough's Proposed Alternative

Our concern has never been whether or not offshore oil development will occur but rather when and under what conditions. Controversy over oil development on the Kodiak OCS stems from a number of specific concerns. Our overall goal as the governing body responsible for all Kodiak Island Borough residents has been to encourage a greater public voice in all matters affecting our shorelines and adjacent waters. During our review of BLM/OCS oil and gas lease sale proposals, three substantive issues have emerged as foci for general public concern. They are: onshore impacts, environmental effects and fishing industry conflicts. Even this breakdown represents an oversimplification of the issues involved because each area of concern overlaps to a great extent with the others.

Although representatives of the public generally share similar concerns, it would be misleading to state that there is agreement on all issues. The Borough's present position regarding Lease Sale 60 is relatively dynamic and represents only a general consensus. Individual groups with specific concerns may articulate positions that vary from the Borough's stance in some respects.

It was our first inclination after reviewing this DEIS to favor some modification of BLM's proposed Alternative IV. This alternative offers substantial reductions in risk to resources of particular concern to Kodiak Island residents.

We note on p. 249 of the draft that elimination of Shelikof Strait tracts offers a 25 percent reduction in the overall risk of a major oil spill. When the potential impacts of the CI sale are removed, however, the probability of reduced impacts in the critical Shelikof Strait area is markedly enhanced. The probability of impacting razor clam beaches near Swikshak, for example, is reduced by about 85 percent. Similarly, the probability of oilspill impacts on western Kodiak Island bays, such as Kupreanof Strait, declines by a like amount (p. 250).

Deletion of the Shelikof Strait blocks from the proposal would significantly reduce the risks of potential oil pollution impacts and fishery conflicts with regard to a number of major fish and shellfish resources. For example, the probability of an oilspill impacting important shrimp areas in Kukak and Kinak bays decreases from 31 percent (the proposal) to 8 percent under BLM's Alternative IV. The elimination of a tanker route through the treacherous waters of Whale Pass greatly reduces the risk to important nearby marine and coastal habitat (p. 250). Removal of the Shelikof Strait tracts and those adjacent to the Barren Islands also greatly reduces the cumulative impacts associated with offshore oil development in the Kodiak-Afognak area (p. 251), especially those impacts that might affect marine birds. Deletion of these tracts would substantially reduce the risk of oilspills and related effects to major sea otter and other marine mammal habitat, particularly in the northern Kodiak Archipelago and Shelikof Strait areas (p. 254). The oil spill risk analysis for Alternative IV shows a substantial reduction in the probability that spills will contact and affect northern and northwestern nearshore areas in the Kodiak Archipelago. Thus, the chance of potential adverse impacts to endangered cetaceans falls from 48 percent to 17 percent (p. 256). Major impacts to the community infrastructure of Port Lions and Kodiak would also be eliminated. In short, deletion of the Shelikof Strait tracts from Lease Sale 60 would markedly reduce the unavoidable adverse effects of development on the resources and environment upon which many of the area's residents depend for commercial gain and subsistence.

The reduction in risks associated with various tract deletions is predicated upon the data and assumptions underlying BLM's oilspill risk analysis. Recent research information made available to the Kodiak Island Borough casts serious doubt on the ability of the models used to determine spill trajectories that accurately predict the speed and direction of oil spills within the proposed lease sale area.

Analysis of National Environmental Satellite Service data collected over the last year and a half indicates that the Alaska Stream bifurcates off the Kenai Peninsula. The northern portion enters Cook Inlet as the "Kenai Current." Warm water from this current apparently limits sea ice distribution to the area above a line between Cape Douglas and Anchor Point.

Freshwater runoff is a major driving force of the current and is influenced from as far south as southeastern Alaska and, possibly, Canada. This runoff results in maximum currents in the fall and minimums in the spring. The current penetrates lower Cook Inlet and Shelikof Strait through Kennedy and Stevenson entrances.

We understand that estimates of the autumn-winter oceanographic conditions for lower Cook Inlet and Shelikof Strait do not exist in the open literature, although Royer (1979, J. Phys. Oceanogr., 9:555-563) has previously suggested that the source of westerly flow at the inlet mouth derives from the shelf region of the Gulf of Alaska off the Kenai Peninsula.

The lower Inlet is shallow, averaging 40-80 meters in depth, while upper Shelikof Strait is up to 180 meters deep. The mouth of the inlet forms a "prominant ramp-like feature" traversing the inlet from east to west along the 100-meter isobath. At the mouth, currents from the entrances parallel the bottom contours which arc from Kennedy Entrance across to Cape Douglas and exit into Shelikof Strait.

The Kenai Current enters Cook Inlet and Shelikof Strait via Kennedy Entrance almost all the time (77 of 82 satellite observations). Once inside, it bifurcates with one branch of warm water extending into Cook Inlet. The greatest penetration of this current occurs in October and early November, when it may extend northward to the Forelands. The second branch of the current continues westward from Kennedy Entrance across the inlet, paralleling the curved bottom contours of the "ramp" and into Shelikof Strait. At high tide, especially in October, the warm water may overshoot the ramp and extend as far as 30 km in the direction of Augustine Island. Temperature observations taken on the Phillips and Dolly Varden oil production platforms tend to verify satellite observations of the behavior and extent of the Kenai Current.

In Shelikof Strait the boundary of the warm water current is deflected into sinusoidal wave trains and cyclonic vortices, particularly in the fall during the period of increased flows. In October there may be as few as three or as many as ten of these wave crests extending as far southwest down the Strait as 500 km from Cape Douglas. These waves undergo considerable interaction with the strong tides of the lower Cook Inlet-Shelikof Strait region. Wave lengths average 45 km while their amplitude does not generally exceed 35 km in upper Shelikof Strait. They appear to move downstream at between 1 and 2 miles per hour in spite of the influence of the tides. Moreover, the cyclonic vortices may either carry some currents toward the Kodiak Archipelago or even set up counter currents northward along the western side of the Strait for short distances.

We do not believe it is possible, in view of this new information, for the existing models to estimate with any accuracy the direction, speed and extent of pollution events. Nor can they be relied upon to estimate environmental impacts in quantitative terms.

Tanker accidents are also a particular hazard with the proposed alternative, given the difficult meteorological conditions, complex oceanic currents and attendant navigational problems associated with the Kodiak Archipelago and Shelikof Strait region.

There are other serious deficiencies in the document that have increased our reluctance to support any alternative involving development at this time. Of major concern is the failure of the document to adequately address any alternatives to the proposed action other than various tract manipulations. This obvious subversion of CEQ regulations is noted in more detail elsewhere in our testimony. The second major deficiency is BLM's pointed declination to address the cumulative impacts this proposal shares in concert with other proposed OCS lease sales scheduled for the Kodiak area. This subject, too, is delt with more fully elsewhere in our testimony.

A commonly held view with regard to the use of an exhaustible environmental resource is that the resource has value only when extracted, or regarded as a storehouse awaiting future exploitation. We contend that the resource may have another value, realized only if it is not extracted. Moreover, it is the loss of this value which may be more importantly irreversible than the use of an exhaustible resource such as petroleum. This value may be termed the resource's option value. That is, the value, in addition to consumer's surplus, that arises from retaining an option to a good or service. In the case of offshore oil, this value includes income from other resource uses (e.g. fisheries) that would be foregone should development occur.

Aside from the obvious desirability of protecting the renewable marine resources upon which our economy and life style are in large part based, we share a general concern with regard to the well being of all members of the ecological community. We hold that no technology or luxury is worth the irreplaceable loss of any species; nor has that loss ever proven necessary to human survival in the past. Whales, sea otters, seals and dolphins have their legions of saviors primarily because we find them to be smart, cute, affectionate or all three. Yet the best evidence suggests that the true foundation for species conservation rests with an ecosystem that makes no value judgements based on how other living species can or cannot relate to humans.

We should not violate environmental life support systems, or even environmental amenities, frivolously. We should not engage in enterprises for which no obvious net gain in welfare for the community can be demonstrated---especially those enterprises that are certain to have deleterious environmental side effects.

Given the uncertainties involved with the USGS oil spill risk analysis, the major commercial and latent fishery resources involved, the complete absence of viable sale alternatives and the total lack of cumulative impact assessment in conjunction with other proposed OCS lease sales in adjacent areas, we have no other recourse but to request that Lease Sale 60 be delayed until such time as these major deficiencies are satisfactorily rectified.

Should a delay in sale not be forthcoming, then we can only reaffirm our long-held position that OCS development be prohibited in Shelikof Strait. This position was first made clear to BLM in our February 27, 1979 letter to the Director. At this time the Kodiak Island Borough adopted Resolution No. 79-9-R requesting that the Shelikof Strait be removed from consideration for outer continental shelf oil development as part of OCS Lease Sale 60 with the exclusion of all submerged lands in the Shelikof Strait south of Cape Douglas (including tract numbers 43, 44, 38 88?, 48, 131, 132, 90, 91, 92, 176, 133, 134, 135, 219, 220, 177, 178, 263, 264, 221, 306, 307, 308, 265, 350, 351, 352, 309, 394, 395, 396, 438, 439, 479 through 483, 522 through 526, 565 through 570, 607 through 613, 651 through 656, 695 through 699, 737 through 742, 781 through 785, 825, 826 and 827).

POSITION PAPER ON FISHERY RESOURCES AND THE MARINE ENVIRONMENT

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Position Paper on Fishery Resources and the Marine Environment

The marine resources of the Kodiak Archipelago and Shelikof Strait regions of the northern Gulf of Alaska support several of the most valuable domestic commercial fisheries existing in the United States today. These domestic fisheries represent the major source of income to Kodiak Island residents. Any development that will diminish the value of the several fisheries constitutes a threat to not only the entire economy of the island but to the very way of life shared by the majority of the islanders as well.

All five species of Pacific salmon are harvested in the Cook Inlet-Shelikof Strait region. Pink salmon harvests are important throughout the area. On the Alaska Peninsula side of Shelikof Strait there are seven streams in which the average escapement exceeds 10,000 fish and on the Shelikof Strait side of the Kodiak Archipelago there are 14 streams in which annual escapements are greater than 10,000 fish. The Karluk and Red rivers have averaged 380,000 and 320,000 pinks respectively. Both these rivers have much stronger runs on even years and each had more than a million fish in 1978.

On the Alaska Peninsula side of Shelikof Strait runs of over 5,000 sockeye occur in two rivers. On the Shelikof Strait side of the Kodiak Archipelago there are 13 streams with sockeye runs, most notably the Karluk and Red rivers with average returns of 350,000 and 150,000 respectively for the last 10 years. Of the remaining 11 streams, three have escapements exceeding 10,000 fish. On the Alaska Peninsula side of Shelikof Strait, chum salmon are widespread with 25 rivers having runs greater than 1,000 and in three of these the runs exceed 10,000. On the Shelikof Strait side of the Kodiak Island group 16 rivers have escapements exceeding 1,000 of which six have escapements of more than 10,000.

Significant catches of chinook salmon are made in the various bays along the Shelikof Strait side of Kodiak Island.

On the Alaska Peninsula and in the Kodiak Archipelago virtually every stream supports runs of intertidal spawning pink and chum salmon. On Kodiak this spawning substrate is more important than in other areas and rivers having the largest runs of pink and chum salmon contain the highest proportion of intertidal spawners. These races of intertidal spawners are, of course, extremely vulnerable to the adverse effects of any oil reaching the shore from a spill.

For the period from 1969 to 1975, the annual catch of king crab from the Shelikof Strait region comprised 14 percent of the entire Gulf of Alaska harvest or an average of 1,260 metric tons (mt). Approximately 22 percent of the total Gulf tanner crab harvest, an average of 2,200 mt, was taken from the Shelikof Strait region during the same period. The annual catch of Dungeness crabs from Shelikof Strait averaged 18 percent of the Gulf total, or 344 mt, during the 7-year period from 1969 to 1975. An annual catch of over 2,000 mt of pandalid shrimp was taken from the Strait region between 1969 and 1975.

These fishery resources depend upon the unique habitats vital to species reproduction and development. The greatest concentrations of spawning king crabs occur in Uganik Bay, Viekoda Bay and Kupreanof Strait. The shrimp fishery is conducted in virtually all the bays on the west side of the Kodiak Archipelago, including the north end of Afognak Island. Shelikof Strait south of the latitude of Cape Douglas has been the site of a shrimp fishery since the early 1960's. The most consistently productive sections, Uyak, Uganik, West Afognak, and Kukak, have yielded total annual catches of 1,818 to 3,545 mt with an average annual catch of 2,363 mt. Resource assessments by the National Marine Fisheries Service have shown large concentrations of shrimp occurring in the past in Uganik, Ugak, Marmot Bay, Raspberry Strait and along the northeast side of Shelikof Strait.

In addition to shellfish and salmon, Shelikof Strait supports stocks of other important or potentially important marine fishes. Resource assessment surveys by NMFS research vessels and chartered fishing vessels have been conducted in the northern Gulf of Alaska since 1953 (Ronholt, et al., 1978). The highest abundances of turbot were found in Shelikof Strait and Ugak Bay, walleye pollock in Uyak Bay and sablefish in Raspberry Straits during Cruise 039 in 1958. In 1963 turbot and walleye pollock were abundant in upper Shelikof Strait. The estimated biomass of flatfishes in Shelikof Strait during the summer of 1961 was 44,349 mt.

Roundfishes were also estimated as abundant at almost 19,000 mt, including 12,000 mt of flathead sole, 4,000 mt of rock sole and 3,000 mt of halibut. Later surveys (1973-76) indicated that roundfishes were present in approximately the same abundance but that flatfishes had increased to 24,000 mt. Shelikof Strait offers a reservoir of bottomfish habitat not exploited by foreign fleets and, consequently, provides an excellect potential fishing ground for the growing U.S. bottomfish industry. The existing U.S. bottomfish fishery has been directed at walleye pollock and, to a lesser extent, Pacific cod in central Shelikof Strait. The domestic bottomfish fishery in Kodiak has just started to exploit this resource. Landings of bottomfish have grown from about 6 mt in 1975 to 2,067 mt through July 1979.

It had been suspected from earlier egg and larval surveys that the Shelikof Strait might be an important spawning area for walleye pollock. During a cruise by the R/V Miller Freeman (NOAA Cruise Report, Cruise No. 80-1) from March 12 through 28, 1980 NMFS biologists discovered a continuous concentration of spawning walleye pollock varying from one to several miles in width and extending some 50 to 70 miles doen the strait. A. Crosby Longwell, a biologist and geneticist for the NMFS, has investigated the ways petroleum hydrocarbons affected the

development of fish eggs in oil-polluted waters after the *Argo Merchant* spill on Nantucket Shoals in December 1976. Longwell found that there is mounting evidence that oil is toxic to fish eggs and larvae, and may be lethal to, or adversely affect, their normal cellular division. About half of all the fish eggs examined had oil droplets and tar adhering to their chorions. Fewer cod eggs were fouled than those of pollock. About 20 percent of the cod eggs and 46 percent of the pollock eggs collected at sea were dead or dying with their chromosome division arrested. Some pollock embryos from stations near the slicks were grossly malformed; none were malformed in samples taken at distant locations. Longwell found that the development of abnormal embryos was the principal effect of water-soluble benzene on Pacific herring eggs, thus demonstrating that even small amounts of oil can have disastrous consequences during this most fragile link in the life cycle of fishes in their natural habitat.

Not only can a pollution event create mortality among larval fishes, but its effects may be demonstrable farther down the food web as well. Meiofauna, principally the ostracod *Pontoporiea affinis*, showed an increased frequency of abnormal development or non-differentiating eggs after the *Tsesis* oil spill, which occurred on October 26, 1977 about 50 km. south of Stockholm, Sweden. The drastic reduction in macrofauna abundance after the spill left little doubt that this loss also was a direct effect of the oil (Kineman, et al., 1980). The dominating bivalve, *Mytilus edulis*, declined and drastic effects were noted for the *Fucus* macrofauna in the area. The abundance of all macrofauna species, with the possible exception of the barnacle, *Balanus improvisus*, decreased in oil affected areas.

Damage to the great kelp beds along the shores of Kodiak Island and Shelikof Strait could prove significant. Dr. Wheeler J. North, west coast kelp expert, estimates that each square mile of giant kelp bed is worth about a million dollars

a year (Earle, S.A., 1980).

Studies of intertidal zones subjected to oil spills show that recovery from an oil spill is slowest in fine sediment environments, where oil may persist virtually unchanged in the deeper, oxygen free layers for at least five to ten years (Krebs and Burns, 1977). This persistent oil may continue to present a hazard to the biological community for extended periods of time, preventing its return to pre-spill productivity and providing a potential source of slow, continuous oil leakage to surrounding areas (Vandermeulen and Gordon, 1976).

Razor clams occur throughout the lease area wherever there are sandy beaches. In the Kodiak area virtually all the digging has been done on the Swikshak Beach. Harvests have ranged from 60 to 90 mt but since 1975 there have been only a few thousand kilograms harvested. The causes of catch fluctuations rest upon institutional constraints that make the future of this industry unpredictable. A potential exists, however, for harvesting as much as 450 mt annually. The long-term pollution of razor clam beaches could set back or virtually eliminate razor clam stocks on affected beaches for extended periods of time.

While little enough is known regarding impacts of petroleum on higher life forms, even less understood are the impacts of spilled oil on the primary producers. To begin with, knowledge of phytoplankton distribution in the vicinity of Shelikof Strait is almost nonexistent (Kodiak Intrim Synthesis Report, 1980). This lack of data is unfortunate in view of the high productivity of the region. Petroleum in the marine environment may inhibit phytoplankton growth but impacts vary greatly, depending upon the species involved, environmental conditions and type and concentration of oil. So little is known regarding existing phytoplankton conditions that no evaluation of spill impacts is possible. Little is known regarding zooplankton numbers or distribution as well. A thorough understanding of all invertebrate populations is a prerequsite to assessing the consequences of oil and gas development in the waters surrounding Kodiak Island. Knowledge of the invertebrate life histories, seasonal distributions, population dynamics, and feeding relationships must be known before species vulnerability and sensitivity to environmental disturbances can be determined and used by resource managers in the decision-making process.

The intertidal and shallow subtidal zones of the Kodiak and Shelikof Strait coasts are highly productive. Substrate type is critical in determining intertidal community structure. The Kodiak/Shelikof Strait area contains a high proportion of bedrock and boulder substrates, which support rich macrophyte and invertebrate communities. Thus, these beaches may be especially vulnerable to oil spills because of the preponderance of epilithic biota. The relatively protected coastlines of the Shelikof Strait area, being less susceptible to the mechanical effect of waves as a natural cleaning process, may show the adverse impacts of a spill event for a more prolonged period and to a higher degree.

The huge numbers of marine and coastal seabirds nesting, feeding and rearing in the Afognak/Shelikof Strait area also rely on the coastal zone to provide their necessary life requirements. The three major prey species (euphausiids, capelin, and Pacific sand lance) are present throughout the region in the surface water layers. Most feeding flocks of marine birds occur within 5 km of land, usually in areas of greatest coastline complexity --- the same areas that may be the most susceptible to oil spill impacts. Bird populations in the Kodiak area stand a greater risk from oil contamination than those at lower latitudes. They must endure extremes of weather, uncertain food supply and the need to reproduce in a brief period. Already under stress from the harsh environment, they are thus particularly vulnerable to the stresses associated with oil development.

Certain marine mammals, particularly the sea lion, sea otter and hair seal, depend upon the coastal zone environment. The Marine Mammal Protection Act of 1972, Sec. 2(6), specifically states that:

> "... the primary objective of their management should be to maintain the health and stability of the marine ecosystem."

In view of the high probability of an oil spill event, the critical dependence upon the near shore habitat of the Shuyak-Afognak islands/Shelikof Strait area shared by sea otters and other marine mammals, and the almost certain adverse impacts that will occur to marine mammals, we believe the upper Shelikof Strait area is too critical to be included in any oil lease sale that is responsive in any positive manner to the requirements of, and dangers too, these animals and the other living marine resources depending upon the near shore and coastal environments of the Shelikof Strait portion of Sale No. 60.

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POSITION PAPER ON COMPLIANCE WITH FEDERAL ACTS AND REGULATIONS

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Position Paper on Compliance with Federal Acts and Regulations

Our review of the DEIS for Sale 60 has revealed what we believe to be major deficiencies with respect to meeting the letter and intent of a number of acts, regulations and guidelines. Principal among these is the National Envoronmental Policy Act of 1969 and the Council on Environmental Quality's regulations on implementing NEPA procedures (40 CFR 1500-1508: 43 FR 55990, November 29, 1978; Amended January 3, 1979, Effective July 30, 1979). These deficiencies are listed in more detail in the following discussion.

National Environmental Policy Act

NEPA requires that an EIS include consideration of alternatives to a proposed action (42 U.S.C. Sec. 4332 (a)(C)(iii)). The responsible agency must go beyond simply enumerating alternatives and discuss those elements required by secs. 102(2)(C) (i), (ii), (iv), and (v) of NEPA which are within the scope of the statement and as much of sec. 102(2)(C)(iii) as is necessary to thoroughly alert the reviewer to all the environmental consequences of all reasonable alternatives (NRDC v. Callaway, *surpr,* 524 F. 2nd at 92, NRDC v. Morton, *supra*, 485 F. 2d at 834). NEPA requires that the EIS include information sufficient to permit a reasoned choice of alternatives so far as environmental aspects are concerned. It is crucial, however, that the EIS provide the decision maker with enough information to make that reasoned choice. The discussion of alternatives has been characterized as "the linchpin of the entire impact statement" (Alaska v. Andrus, *supra*, 580 F.3d at 474; Monroe County Conservation Council, Inc. v. Volpe, 472 F.2d 693, 697-98 (2nd Cir. 1972).

The DEIS contains no substantive discussion of energy sources alternative to exploitation of OCS lands proposed by this sale. Specifically, there is no meaningful discussion of alternative sources of oil and gas, particularly sources offering lesser chances for environmental damage. Nor are other fossil fuel technologies such as the flash conversion process, supercritical gas extraction and fluidized bed systems explored.

The alternatives offered here are only variations of a single proposal and do not encompass the wide range of reasonable and available alternatives. The need for an EIS to clearly identify distinct alternatives has been expressed on several occasions (Alaska v. Andrus, 580 F.2d 465, 474 (D.C. Cir. 1978); NRDC v. Callaway, 524 F.2d 79, 92-93 (2nd Cir. 1975); Monroe County Conservation Council v. Volpe, *ibid*; Calvert Cliffs' Coordinating Comm. v. Atomic Energy Comm'n, 449, F.2d at 1114). The EIS must also consider those alternatives to the proposed action that may either partially or completely meet the proposal's goal and it must evaluate their comparative merits (NRDC V. Callaway, 524 F.2d 79 (2nd Cir. 1975); NRDC v. Morton, 458 F.2d 827 (D.C. Cir. 1972).

The alternatives are, for the most part, non-analytical in nature and the DEIS fails to adequately analyze the No Action alternative or alternatives outside the jurisdiction and control of the lead agency (BLM). The alternatives are weighed in favor of the proposed action and do not emphasize mitigation measures beyond existing statutory provisions. Nor does this DEIS cross-reference sections on affected environment or environmental consequences.

Section 102 (2) (D) of NEPA expressly directs Federal agencies to:
"study, develop and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources." 40 CFR 1502.14 (a, b and c) directs the responsible agency to:

"(a) Rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated."

"(b) Devote substantial treatment to each alternative considered in detail including the proposed action so that reviewers may evaluate their comparative merits."

"(c) Include reasonable alternatives not within the jurisdiction of the lead agency."

The EIS should include sufficient analysis of such alternatives and their costs and impacts on the environment so as to not prematurely foreclose options that might have less detrimental effects. An environmental statement should describe these alternatives in such a manner that reviewers can independently judge if the environmental impacts result from trying to gain maximum economic return or are inherent to the entire project.

This description not only requires complete alternatives that would accomplish the objective with less impact, but also non-structural alternatives and those that include elimination of certain "high environmental impact" aspects of the proposed action.

Court decisions under NEPA have established that the "detailed" statement referred to in section 102 of the Act must thoroughly explore all known environmental consequences of alternatives to major proposed actions even though this may lead to consideration of effects and options outside the agency's actual control. Viewed as simply an application of NEPA's "full disclosure" requirement. This basic principle is meant to ensure that relevant officials and the public are alerted to the environmental impact of Federal agency action (see EDF v. Corps of Engineers, 2 ERC 1260, 1267 (E.D. Ark. 1971).

Furthermore, the range of impacts which must be considered cannot be limited to the traditional area of agency jurisdiction or expertise. NEPA in essence adds a new mandate to the enabling legislation of all agencies, requiring the development of environmental awareness for the full range of impacts of proposed agency action. By failing to discuss reasonably foreseeable alternatives and impacts or by discussing those alternatives and impacts in a perfunctory manner, an agency defeats the purpose of the statement and lays itself open to the charge of non-compliance with the Act (NRDC v. Morton, 3 ERC 1558, 2 ELR 20029 (D.C. Cir. 1972). Here the court affirmed the district court's ruling that the Interior Department's 102 statement on a proposed sale of leases for oil and gas extraction on the OCS was legally inadequate. The court held that the 102 statement was required to discuss the environmental effects of reasonable alternative courses of action, including courses of action not within the authority of the Department to adopt.

Environmental impact statements shall also state how alternatives considered in them and decisions based on them will or will not achieve the requirements of sections 101 and 102 (1) of NEPA and other environmental laws and policies (40 CFR 1502.2 (d) of the current CEQ regulations).

We note that CEQ Regulation 1502.14(e) calls for the lead agency to identify its preferred alternative and we assume that Alternative I represents said preferred alternative. The disclaimer appearing on p. 25 of the draft, however, does not appear to meet the intent of the CEQ regulation referred to above. Without identifying a preferred alternative, the lead agency leaves the decision maker in limbo when attempting to make an intelligent judgement regarding alternative proposals and their relative impacts and merits. It is incumbent upon the lead agency to provide the reviewer with some direction, by means of identifying a preferred alternative. While we believe the major portion of this DEIS clearly points to Alternative I as being preferred by BLM, the statement on p. 25 does not, in our view, make our understanding of BLM's intent unequivocal.

Sec. 1502.14(b) of the CEQ regulations specifically charges the lead agency to: "Devote substantial treatment to each alternative considered in detail including the proposed action so that reviewers may evaluate their comparative merits." The statements that impacts are "reduced substantially" or moderated by an "unquantifiable extent" with alternatives contributing only an "indeterminable incremental risk" hardly provide the reviewer with the exactness required to place alternatives in proper perspective.

While we fully appreciate the unquantifiable nature of much of the information needed to evaluate various alternatives, we know that catch and effort statistics exist for reporting areas falling within certain risk probability zones. Thus, probable losses to fishery values could be estimated. Nowhere in the body of this DEIS, however, is the value or magnitude of the several commercial fisheries involved even mentioned, except for aggregated catch statistics for recent years found in Table III.B.2.c.-1 through 6 and Table III.B.2.d.-1 through 6.

The following passage confirms our contention that the alternatives presented in this DEIS fail to meet the intent of NEPA and that this DEIS does not conform to current CEQ regulations regarding the consideration and presentation of alternative courses of action. We quote from p. 131, paragraph 3:

> "In comparing the development phase of the proposal with those of the alternatives, it is apparent that the scenarios for the alternatives are, for the most part, variations on the scenario established for the proposal. Alternatives IV and V are essentially the Cook Inlet portions of the proposal's scenario. Alternative VI is essentially the southern half of the proposal but differs from it in that extracted gas will be reinjected into the formation. The maximum case scenario ... is exactly that of the proposed action."

We contend that this totally inadequate treatment of alternatives represents a blatant circumvention of the intent of NEPA and current CEQ regulations and renders this DEIS both technically and substantively deficient.

In addition to the Lower Cook Inlet-Shelikof Strait lease sale, other significant federal and state energy development projects are in progress or planned for the western Gulf of Alaska region. Principle among these is OCS Lease Sale No. 61 for which nominations are due in November, 1980 and a DEIS by March 1982, less than a year and a half from now. These developments taken as a whole can be expected to have significant cumulative effects on the marine environment surrounding the Kodiak Archipelago far in excess of the impact that would be expected from any one project standing alone. If there are several projects that will have cumulative effects upon a region such that the environmental consequences of a particulare project cannot be considered in isolation, the decision maker must be alerted to those cumulative impacts (Kleppe v. Sierra Club, *supra*, 472 U.S. at 409-10).

In this DEIS, consideration of cumulative impacts is essential if the decision maker is to be alerted to realistic possible consequences of the proposed action. The discussion of cumulative impacts need not be overly detailed; like other aspects of the EIS, it is governed by the rule of reason. The discussion must, however, furnish such information as appears reasonably necessary under the circumstances for project evaluation (see NRDC v. Callaway, 524 F.2nd 79, 88, 2nd Cir. 1975). The cumulative effects of other projects that can be expected to have similar impacts must be acknowledged.

On p. 127, paragraph 3, of the draft the statement is made that the discussion of cumulative effects will be based on the interrelationship of the proposed action and "other major, current, and proposed projects." The reader is referred to Section IV.A.1.h. for a list of projects considered in preparation of the cumulative effects sections of this DEIS. Here, on p. 148, Sec. h, we find the draft lists other major projects "which may occur, in the near future, *within or close to* the sale area" (emphasis added) that have been "considered in the cumulative effects sections of this document." We find that we might expect cumulative effects from such projects as the Beluga Coal Field and the Bradley Lake Hydroelectric Project but that this DEIS *WILL NOT* include an evaluation of cumulative effects in regard to Lease Sale 61! Sale 61 is not included because:

> "For such an evaluation to be made, at minimum, the Alaska OCS Office would have to know what the sale 61 resource estimates will be, what the areas of particular interest will be to industry, government, and special interest groups, and finally, what the area selected for further study (e.g., the proposal) will be. As none of this information is presently available, there is no basis on which to make an environmental assessment of the sale 61 area; hence, no viable assessment of the interrelationship of the two sales is at this moment possible."

A cumulative impact is defined by CEQ as:

> "...the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions" (40 CFR 1508.7).

We hold that a substantive nexus exists between lease sales 60 and 61 in respect to potential cumulative impacts that simply cannot be ignored. Despite the declaration that no cumulative effects can be determined at this time between Lease Sale 60 and Sale 61, cumulative effects of the two sales are mentioned either directly or indirectly elsewhere in the text of this DEIS on pp. 4, 18, 127, 170, 185, 199 and 245.

We believe this DEIS fails to consider the cumulative impacts lease sales 60 and 61 will have upon the natural and human environments of Kodiak Island. Furthermore, stating that an evaluation of cumulative effects will appear in the DEIS for Sale 61 means that the BLM will only consider the cumulative effects of the two sales *after* a decision has already been reached regarding the first, hardly the time for looking at cumulative impacts!

Not more than 6 months ago the Alaska OCS Office held hearings on the *second* DEIS for the area encompassed by the now canceled Sale 46. Merely changing the sale number cannot change the fact that hundreds of hours and thousands of dollars have literally been poured into the sale 61 area in a research effort that has spanned years. If we do not know enough about that area today to estimate cumulative effects in conjunction with Lease Sale 60, how did we know enough about it 6 months ago to prepare a DEIS for Lease Sale 46?

We submit that the BLM has failed to assess its proposed action for its cumulative effects on the environment in direct violation of NEPA, Sec. 102 (2)(C)(iv). We further submit that the BLM has, in an intentional and premeditated manner, avoided addressing such cumulative effects and, further, in doing so has rendered this DEIS deficient and inadequate.

Any treatment of the environmental consequences of a proposed action, Sec. 102(2)(c)(i) of NEPA, must include discussions of the energy requirements and conservation potential of various alternatives and mitigation measures (40 CFR 1502.16(e) of the CEQ regulations). Section 1502.16(f) calls for discussions of the natural or depletable resource requirements and conservation potential of various alternatives and mitigation measures as well. The particular economic and technical benefits of any planned action must be assessed and then weighed against the environmental costs; alternatives must be considered that would affect the balance of values (Calvert Cliffs' Coordinating Comm. v. AEC, *op. cit.*).

We contend that it is incumbent upon any Federal agency to demonstrate that a proposed action is not only cost effective but energy effective as well if that agency is to fully respond in an aggressive and positive manner to the Administration's mandates of energy self-sufficiency and conservation. In the past agencies have been required to include a section explaining how the benefits and costs are calculated, and then detail what items are included as a benefit or cost and the valuation of each (Cape Henry Bird Club v. Laird, 359 F.Supp.404,414(W.D. Va.1973), aff'd, 484 F.2d453(4th Cir. 1973); see also EDF v. TVA (Tellico Dam II), 371 F. Supp. 1004, 1010-1011 (E.D. Tenn. 1973), aff'd, 492 F.2d 466 (6th Cir. 1974); EDF v. TVA (Tellico Dam I), 339 F. Supp. 806 (E.D. Tenn. 1972), aff'd, 468 F.2d 1164 (6th Cir. 1972); Alabama ex rel. Baxley v. Corps of Engineers, 411 F. Supp. 1261, 1268-1271 (N.D. Ala. 1976). Still other courts have gone further and have undertaken a substantitive review of benefit/cost analyses and methodology, requiring in particular that environmental "costs" be included where similar environmental "benefits" have been credited to the project (Sierra Club v. Froehike, 359 F. Supp. 1289, 1363 (S.D. Tex. 1973), rev'd on other grounds sub nom. Sierra Club v. Callaway, 499 F.2d 382 (5th Cir. 1974). See also Alabama ex.rel. Baxley v. Corps of Engineers, 411 F. Supp. 1261; Montgomery v. Ellis, 364 F. Supp. 517, 532-33 (N.D. Ala. 1973).

Private enterprise can write off the costs involved with exploration and development as tax deductions. But Federal agencies, dealing as they do with public resources and tax dollars, cannot legally or morally afford that luxury. It is absolutely essential for any rational evaluation of lease sale No. 60, or any other lease sale for that matter, to demonstrate the relationship of expenditures to expected returns, not only for dollars spent but for energy expended. In other words, is there a reasonable expectation that the BTUs derived from development of the resource will exceed the BTUs required to develop, produce and transport the product(s) to its ultimate point of consumption? If not, then the entire

proposal is absolutely inconsistent with any rational energy program. To date, OCS development in the Gulf of Alaska represents an energy deficit of considerable magnitude. Yet, nowhere in this DEIS do we find any estimate of the relationship between dollar expenditures and estimated return or energy required for that which might be gained. Simply, there is no measure of the cost effectiveness of the proposed action. Will lease sale 60 become part of the energy problem, or will it contribute to the solution. How can any decision be made regarding the desirability of the proposed action without knowing the costs involved and relating them to the probability of a return that may or may not exceed the level of investment?

The worst case analysis described in this DEIS is inadequate according to current CEQ regulations (40 CFR 1502.22). While the BLM has prepared a worst case analysis covering endangered cetaceans (p. 281), such an analysis does not meet current regulation stipulations because it only considers effects on endangered whale species. Under current CEQ regulations, however, the worst case analysis must alert the decision maker to the costs of uncertainty beyond just endangered species.

Agencies are required to identify any methodologies used and shall make explicit reference by footnote to the scientific and other sources relied upon for conclusions in the statement (40 CFR 1502.24). Statements on pp. 151 and 165, among others, are not so referenced.

According to CEQ regulations the draft environmental impact statement shall list all Federal permits, licenses, and other entitlements which must be obtained in implementing the proposal. This DEIS fails to include such a list and is, therefore, deficient on this count.

BLM Guidelines and Lease Sale Schedule

Out of the 22 offshore leasing areas considered for sales during the 1980-85 period by the BLM, industry ranked Sale 60 as 16th in resource potential and 13th for interest in exploration (Proposed Five-Year OCS Oil and Gas Lease Sale Schedule, March 1980-February 1985, USDI/FES). This interest rating may have been altered somewhat by the drilling of 7 dry holes in the CI sale.

At the beginning of 1980, Sale 60 ranked 11th out of 15 proposed sales in mean estimated resource availability and was estimated to contain 160 million barrels of oil (2.4 percent of the total estimated production and 2.7 percent of the total area proposed for leasing, 5-year Schedule FES, p,43). The mean estimate in the DEIS for Sale 60, however, places total production at 670 million barrels (Table II.B.1.a.-1). It is difficult to know whether this increase of over 4-fold is due to new information, the addition of Shelikof Strait lease tracts or a combination of both. No explanation is offered by the BLM to account for this quadrupling in potential production over a period of just 8 months. The basis for this huge increase should be well documented in the FES. This latest estimate would place Sale 60 in 6th position with regard to potential oil production if the values estimated for the other Alaska sale areas remain unchanged from those presented in the 5-Year Sale Schedule FES.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act of 1918 has been held applicable to non-hunting commercial practices, creating criminal liability for negligent conduct that causes the death of birds (see United States v. Corbin Farm Services, 444 F. Supp. 510 (E.D. cal.), aff'd in part, 578 F. 2d 259 (9th Cir. 1978); United States v. FMC Corp., 572 F. 2d 902 (2nd Cir. 1978). From the description of possible impacts on marine bird populations, including migratory waterfowl,

found on pp. 170-176, we must conclude that the development of OCS resources in the Lower Cook Inlet/Shelikof Strait sale area would inevitably result in violations of the Migratory Bird Treaty Act.

The DEIS notes (p. 175) that the "greatest risk to coastal bird habitats due to oilspills is within Shelikof Strait." The DEIS concludes that "depending on the location, size, and season of the spill, thousands and perhaps several hundred thousand birds could be directly killed by a large oilspill...vulnerable species could take as long as 50 years to recover from a single 50 percent mortality event." From these statements it would appear that the proposed alternative has every likelihood of causing mortality to migratory birds, and thereby violating provisions of the Migratory Bird Treaty Act. We note that Alternative IV would greatly reduce the probability of such adverse effects to migratory birds. Deletion of the Shelikof Strait blocks would reduce the probability of oilspill contact at sea and markedly lower the probability of risk to coastal habitats (p. 251).

The conclusion is reached (p. 183) that oilspills, noise and disturbance accompanying OCS development could result in "acute" direct or indirect effects on marine mammals. This discussion indicates that activities proposed in this DEIS can result in violations of the Marine Mammal Protection Act of 1972. We note, however, that the DEIS concludes (p. 254) that Alternative IV would afford a "substantial reduction" in risks to major sea otter and certain harbor seal habitats, particularly those in the northern Kodiak Archipelago and Shelikof Strait, when compared to the proposal.

The oilspill risk analysis for Alternative IV shows a substantial reduction in the probability of a spill contact and potential spill effects to endangered and non-endangered cetaceans in the nearshore areas of the northern and northeastern Kodiak Archipelago and Shelikof Strait, especially the eastern side.

Risks would drop from 48 percent (proposed action) to only 17 percent under Alternative IV. The DEIS concludes (p. 192) that the possibility exists for endangered and non-endangered cetaceans to sustain direct and indirect effects in areas of high risk such as the northern Kodiak Archipelago and eastern Shelikof Strait. The cumulative probability of oilspills is high in these areas. We conclude from this discussion that Alternative IV offers a significant reduction in probable impacts to endangered cetaceans from OCS development while, of all the alternatives, the proposal poses the most potential for cetacean disturbance.

DRAFT ENVIRONMENTAL IMPACT STATEMENT
PROPOSED OUTER CONTINENTAL SHELF
OIL AND GAS LEASE SALE
LOWER COOK INLET/SHELIKOF STRAIT
SALE NO. 60

Page by Page Review

prepared for the

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by

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September 15, 1980

PAGE BY PAGE REVIEW

p. i, Environmental Impacts, para. 3, line 2

Change "them" to "it" to agree with "each" on the preceding line

p. ii, para. 5, line 6

Add "s" to "exist" to agree with "population"

p. iii, para. 1, line 20

Delete "using an extended harvest range" and insert "extending the harvest range"

para. 2, lines 5-9

We fail to see how impacts "centering on the effects of competition for scarce community goods and services" are expected to be "interpreted primarily as benefits." The final EIS should explain how this interpretation is reached and upon what authority this claim is based.

Neither here nor elsewhere in the draft do we ever see more than illusion to the perceptions of Port Lions residents towards OCS development. Everywhere, however, we are led to believe Port Lions residents will welcome OCS development. Yet, when we read closely we find that the "effects are expected to be interpreted primarily as benefits." Expected by whom? Interpreted by whom? Nowhere in the draft is there any indication that any official poll or vote was taken to substantiate these suppositions. One reference is made on p. 198 to talks with Port Lions residents that "suggest that the town would respond well to a change of this magnitude." We seriously question the validity of this perception on the part of BLM and ask that it be fully substantiated in the final EIS for Lease Sale 60.

p. iii, para. 3, line 4

We are not as disenchanted with a "slow" growth rate of 3 percent as the BLM appears to be. After all, it is the horrendous growth rate that has gotten us into the fuel crisis to begin with. Any inference that a low growth rate is bad is subjective and should be avoided.

p. iii, para. 3, last sentence

We fail to see how the lease sale would be expected to produce "little or no economic stimulus to the villages on ... Kodiak Island." Port Lions is located on Kodiak Island and the first sentence of the paragraph says the location of an oil storage and tanker terminal facility near Port Lions would create a major economic stimulus. One or the other of these statements must be in error.

p. iv, Alternatives to the Proposed Action

The selection of alternatives fails to meet the intent of NEPA as set forth in the latest CEQ Regulations (40 CFR 1500-1508; 43 FR 55990, Nov. 29, 1978; Amended Jan. 3, 1979, Effective July 30, 1979). The alternatives offered here are only variations of a single proposal and do not encompass the wide range of available opportunities. The alternatives are, for the most part, non-analytical in nature and the DEIS fails to adequately analyze the No Action alternative or alternatives outside the jurisdiction and control of the lead agency. The alternatives are weighed in favor of the proposed action and do not emphasize mitigation measures beyond existing statutory provisions. Nor does this DEIS cross-reference sections on affected environment or environmental consequences.

p. v, Local Government

The list of officials from Kodiak is outdated. It is true, however, that these individuals may have been incumbent when scoping comments for Lease Sale No. 60 were solicited by BLM.

p. 10, Establishment of Compensatory Funds, para. 2

We should like to note in passing that any claim settlement reached to compensate for a loss of natural resources will be purely arbitrary because it is impossible to determine the full extent of environmental damage resulting from any oil-related perturbation.

p. 11, Sec. 2, para. 3, line 1

"Contingency" should read "Compensation"

p. 23, Sec. A, para. 1, line 3

Delete comma after "settings" and insert after "which"

p. 25, para. 2

We are at a loss to understand how, on the one hand, this DEIS proports to present us with a description of a proposed action while, at the same time, the BLM tells us that all scenarios only represent conditions that, at present, seem likely and do not represent a BLM recommendation, preference, or endorsement of facility sites, or development schemes.

We note that CEQ Regulation 1502.14(e) calls for the lead agency to identify its preferred alternative and we assume that Alternative I represents said preferred alternative.

The disclaimer appearing on p. 25 of the draft does not appear to meet the intent of the CEQ regulation referred to above. Without identifying a preferred alternative, the lead agency leaves the decision-maker in limbo when attempting to make an intelligent judgement regarding alternative proposals and their relative impacts and merits. It is incumbent upon the lead agency to provide the reviewer with some direction, by means of identifying a preferred alternative. While we believe the major portion of this DEIS clearly points to Alternative I as being preferred by BLM, the statement on p. 25 does not, in our view, make our understanding of BLM's intent unequivocal.

p. 26, para. 3, line 3

Insert comma after "Peninsula"

p. 29, Potential Mitigating Measure No. 1

We have no disagreement with the mitigating measure of protecting protrusions, if feasible (whatever that means). We hope it is always feasible to offer some measure of protection to an established user (i.e. fishermen). What we want to know is, will the measures work? All the stipulations in the world are not worth the paper they are printed on if the gear can't pass over the structure.

References to tests, studies, etc. would be useful here to help the reviewer assess the adequacy of this measure.

p. 30, Evaluation of Effectiveness

We are not certain after reading this paragraph whether or not the measure was ever actually adopted. We read that the measure "should be adopted" and that there was "agreement to adopt" but nowhere is it clearly stated that the measure is now in effect for this proposed sale. Similar wording on pp. 31, 33, 35 and 36 also leads us to question the final disposition of the measures in question.

p. 40, para. 1, line 12

Temporary interference to fishing in Kizhuyak Bay is referred to. The lack of data regarding the type(s) and magnitude of this fishery makes any analytical evaluation of this impact impossible --- except, possibly, for someone active in that particular fishing area.

p. 40, Sec. 2.b., para. 1, line 3

We cannot accept the premise that not holding Sale 60 will "create the national need to develop alternative energy sources." This need has been evident for some time and has long been recognized by leading energy authorities in both government and industry.

para. 2, line 6

To say that sale cancellation will result in increased imports is only true if oil and gas are found in commercial quantities. It is equally as valid to say that holding Sale No. 39 in the northern Gulf of Alaska resulted in increasing foreign imports therefore Sale 60 should not be held for fear of increasing them some more!!

Table II.B.2.b.-1

The nuclear capacity and fuel requirements to replace the anticipated oil and gas production from proposed OCS Sale 60 may equal the anticipated energy loss

in theory but there is not a nuclear reactor in the United States with an 80 percent plant factor and no plutonium recycling is now taking place. Thus, it is absurd to consider a nuclear replacement as viable, especially since no comparative costs are included. Cost overruns, delays, accidents, shoddy and unsafe construction and labor disputes have pushed costs of the two Washington Public Power Supply System (WPPSS) reactors at Hanford, WA to astronomical figures that increase at such a rate there is little point in quoting them here because they will be out of date tomorrow by a million dollars or more.

p. 47, Sec. C, para. 4

Sec. 1502.14(b) of the CEQ Regulations specifically charges the lead agency to: "Devote substantial treatment to each alternative considered in detail including the proposed action so that reviewers may evaluate their comparative merits." The statements that impacts are "reduced substantially" or moderated by an "unquantifiable extent" with alternatives contributing only an "indeterminable incremental risk" hardly provide the reviewer with those tangible handles required to come to grips with alternatives so that they may be placed in proper perspective with each other. Like a handful of Silly Putty, each alternative always remains in some amorphous, intangible state, defying all the reviewer's attempts to pin it down for inspection.

While we fully appreciate the unquantifiable nature of some of the data, we know that catch and effort statistics exist for statistical reporting areas falling within certain risk probability zones. Thus, probable losses to fishery values could be estimated. Nowhere in the body of this DEIS is the value or magnitude of the several commercial fisheries involved even mentioned.

p. 50, para. 3, line 2

Change "were" to "was" to agree with "share"

p. 51, para. 2, line 3

The observation that a rate of growth of almost 69 percent is "healthy" is judgemental. The use of such subjective terms cannot help but bias a reviewer's opinion and their inclusion should be avoided in any objective treatment.

p. 51, para. 2, line 5

Change "severely impacted" to "strongly influenced." Severely impacted more properly describes a bad auto accident or a sore tooth.

p. 53, last line

Change "is" to "was" and place the rest of the discussion in past tense --- if, in fact, the facility was closed on the date indicated.

p. 56, para. 1, line 2

Change "ended' to "ending"

Table III.C.2.b.-8

Why are 1977 data reported in the text of the DEIS when Graphic 14 refers to a 1980 KANA subsistence survey? It would seem ill-advised not to present the most recent data available in both cases.

p. 58, para. 1, line 6

Typo in "manufacturing"

p. 66, para. 1, line 4

Typo in "addition"

p. 69, Composition of Employment, para. 1, line 7

Strike last "a" in second "area" to then read "are"

p. 70, para. 3, lines 1 & 2

1979 is over, this is 1980. What did happen would be more to the point.

p. 77, Enlargement ... Monument, line 7

Change "are" to "is" to agree with "enlargement"

p. 77, Lake Clark ... Monument, line 12

Change "of" to read "to"

p. 82, para. 3, line 3

We question the accuracy of the figure of 1,525 berths for the Homer small boat harbor expansion.

p. 83, para. 4, penultimate line

Strike parenthesis before "Wakefield" and insert comma

p. 83, penultimate paragraph, last line

Source of personal communication has been omitted

p. 84, para. 1 & 2

Sources of personal communications are not identified

p. 85, penultimate paragraph, line 1

"ajoined" should read "adjoining"

p. 88, penultimate paragraph, line 1

Delete "of" and insert "on"

p. 95, District Program Development, lines 1 & 2

Either make "area" plural or change "are" in next line to "is"

p. 100, Energy Facility Siting Analysis, para. 3, line 3

Personal communication is not identified, use lower case

p. 101, para. 8

Personal communication is not identified

p. 102, para. 2, line 3

Change "effect" to "affect"

p. 107, BLM Studies Program, para. 2, line 4

Change "were" to "was" to agree with singular subject "program" on preceding line

p. 109, para. 3

How was an accurate spill trajectory model for the area developed without this information?

p. 119, para. 3, line 1

Change "in" to "from"

p. 119, para 3

To which specific treaty does this statement refer? We believe the statement should read "limits ... catches to beyond the 200-mile limit."

p. 127, para. 3

The statement is made that the discussion of cumulative effects will be based on the interrelationship of the proposed action and "other major, current, and proposed projects." The reader is referred to Section IV.A.1.h. for a list of projects considered in preparation of the cumulative effects sections of this DEIS. Turning to the referenced section, we find that we might expect cumulative effects from such projects as the Beluga Coal Field and the Bradley Lake Hydroelectric Project but that this DEIS WILL NOT include an evaluation of cumulative effects in regard to Lease Sale 61!! We find this position absolutely unacceptable and submit that such an arbitrary and capricious decision on the part of BLM totally disregards both the intent and the letter of the law (NEPA) and current CEQ regulations governing the identification and treatment of cumulative impacts.

Table IV.A.1.a.-1, Drill Muds, Maximum Case

"2740 mt" should read "27405 mt"

p. 131, para. 3

The following passage confirms our contention that the alternatives presented in this DEIS fail to meet the intent of NEPA and that this DEIS does not conform to current CEQ regulations regarding the consideration and presentation of alternative courses of action. We quote:

"In comparing the development phase of the proposal with those of the alternatives, it is apparent that the scenarios for the alternatives are, for the most part, variations on the scenario established for the proposal. Alternatives IV and V are essentially the Cook Inlet portions of the proposal's scenario.

Alternative VI is essentially the southern half of the proposal but differs from it in that extracted gas will be reinjected into the formation. The maximum case scenario ... is exactly that of the proposed action."

We contend that this totally inadequate treatment of alternatives represents a blatant circumvention of the intent of NEPA and current CEQ regulations and renders this DEIS for Lease Sale 60 both technically and substantively deficient.

p. 132, para. 2, line 6

Typo in "natural"

p. 132, para. 3, sentence 2

Does the oil spill risk analysis take into account the delivery of LNG to a California port and the delivery of crude oil to terminal destinations in the contiguous states? These risks must be factored into the model since risk does not cease once a vessel leaves Kodiak waters. Impacts associated with Lease Sale 60 do not stop until products from this lease sale reach their port of destination and are transferred to existing facilities. If the proposed LNG gasification (isn't degasification incorrect? Aren't we turning LNG into gas in California?) plant at Point Conception is being constructed to handle LNG from Lease Sale 60 then, of course, the environmental impacts of plant construction and operation must also be included in the FES for this sale. This draft is supposed to address impacts associated with the entire sale, not just those that involve only Alaska. To omit such a significant area of coverage seems to us to be an oversight not consistent with provisions outlined in NEPA for the review of all environmental impacts associated with the proposed action.

p. 133, para. 2, line 5

What "past OCS experience" is available from Alaska upon which to predict "future spill frequencies?"

p. 133, para. 1, last sentence

Where is all this oil expected to come from? Why is it not mentioned in a

discussion of cumulative impacts?

p. 133, para. 3, line 5

Change "are" to "is" to agree with "average" on preceding line

p. 136, para. 2, sentence 2

This statement is somewhat misleading since adding current activity does not increase the risk of the proposed action because the events are assumed to be independent (p. 133, para. 2) of each other. In addition, to date drilling in Sale CI indicates a low potential for oil and, therefore, a considerable reduction in risk which, in turn, makes the risk from Sale 60 proportionally much higher if the risks are to be aggregated.

p. 137, penultimate para., last sentence

Such an assumption is invalid.

p. 140, penultimate para., line 5

Change "is" to "are" to agree with "locations," the subject of the sentence

p. 141, Sec. f

Over 4 pages are used to describe the several oilspill response organizations response plans in effect, requirements, equipment deployment and policies, but nowhere in the entire document is the actual capability for cleaning up spills addressed.

p. 139, para. 4, para. 6 and line before Deltas

All three references to Hayes, et al. have the year of publication missing

p. 140, line 1

Reference to Hayes, et al. omits date of publication

p. 144, para. 1

Discussion of cleanup techniques makes no reference to equipment capability. The DEIS goes into great detail regarding the response plan but gives no indication of the actual field capability of the available personnel and spill cleanup measures to be employed.

p. 145, para. 1

It is difficult to see how the OSC can advise a spiller in writing that his actions are inadequate, note spiller's failure and assume Federal responsibility --- all within a space of time short enough to effectively clean up a spill when the time required for a spill to reach shore may be as little as 72 hours.

p. 147, para. 4

We are not convinced that any tsunami warning system would provide enough warning to evacuate offshore facilities in time to prevent a disaster. Pending notice was given residents in the vicinity of Mt. St. Helens, yet over 30 people lost their lives, partly due to communication breakdowns and a lack of assigned responsibility. What assurance do we have that coordinating four different sources of information on Augustine Volcano would not result in the same sort of horrible debacle?

p. 148, Sec. h

The draft lists other major projects "which may occur, in the near future, within or close to the sale area" (emphasis added) that have been "considered in the cumulative effects sections of this document."

We read on p. 150, however, that proposed OCS Lease Sale 61 is not included in the draft because:

"For such an evaluation to be made, at minimum, the Alaska OCS Office would have to know what the sale 61 resource estimates will be, what the areas of particular interest will be to industry, goverment, and special interest groups, and finally, what the area selected for further study (e.g., the proposal) will be. As none of this information is presently available, there is no basis on which to make an environmental assessment of the sale 61 area; hence, no viable assessment of the interrelationship of the two sales is at this moment possible."

This statement simply defies the imagination! Not more than 6 months ago the Alaska OCS Office held hearings on the second DEIS for the area encompassed by lease sale 46. Merely changing the sale number cannot change the fact that hundreds of hours and thousands of dollars have been poured into the sale 61 area for literally years. If we do not know enough about that area today to estimate cumulative effects in conjunction with Lease Sale 60, how did we know enough about it 6 months ago to prepare a DEIS for Lease Sale 46?

We hold that a substantive nexus exists between OCS Lease Sale 60 and OCS Lease Sale 61 in respect to potential cumulative impacts that simply cannot be ignored. We further submit that BLM has, in an intentional and premeditated manner, avoided addressing such cumulative effects and, further, in doing so has rendered this DEIS deficient and inadequate under NEPA and applicable CEQ regulations.

Despite the declaration that no cumulative effects can be determined at this time between lease sale 60 and sale 61, cumulative effects of the two sales are mentioned either directly or indirectly elsewhere in the text of this DEIS on pp. 4, 18, 127, 170, 185, 199 and 245.

Furthermore, stating that an evaluation of cumulative effects will appear in the DEIS for Sale 61 means that the BLM will only consider the cumulative effects of the two sales after the decision has been made regarding Sale 60!! Hardly the time for looking at cumulative impacts!!

p. 150, Lower Cook Inlet Sale, line 1

What does "some" mean? Are there also "other" seven dry holes? As writers of technical documents you must continually strive to eschew obfuscation.

p. 151, Oilspills, last sentence

Please cite the scientific reference(s) supporting the statement that natural gas and gas condensates evaporate rapidly in northern waters, so rapidly, in fact, that their presence during a spill represents no potential for environmental damage.

p. 151, para. 3

"Major" oilspill is defined here as all oilspills exceeding 1,000 barrels. On p. 144 a "major" oil spill is defined as one that exceeds 100,000 gal. Since there are 42 gal./bbl then 42x1,000 = 42,000 gal., constituting a "major" spill. Which figure represents a "major" spill? This term must be rigorously defined for legal purposes, if for no other reason.

p. 153, para. 3, line 4

Should "rate" read "fate" instead?

p. 154, Conclusion, line 2

Typo in "disturbances"

p. 154, Conclusion, line 4

What does the term "additional" refer to? We assume additional to spills from Sale CI, etc.

p. 154, para. 2

Unclear why fishermen, communities and State would be made to assume costs in the first place (implied by use of word only) other than any losses suffered due to destroyed resources and reflected by loss of income.

p. 154, Cumulative Effects

It is euphemistic to refer to the risks associated with the proposed action as being smaller when, of course, they are larger than the present risk to much of the area and become greater and greater as each dry hole is drilled in Sale CI. The 99.5 percent chance of impact indicates a fairly high level of risk is involved.

p. 156, para. 1, line 9

Applications cannot test for anything. They may, however, include the requirement that tests be performed.

p. 158, Conclusion

Not only will the species impacted suffer, but so will the entire ecosystem. Impacts simply cannot be subjectively thought of and expressed as the loss of some unknown number of a single species having some corresponding dollar value.

The impacts of an oil pollution event transcend species of economic and/or aesthetic importance to involve the entire biotic and abiotic environment. Until the significance of the complexity of the marine ecosystem as an interacting, holistic, synergistic system is grasped by BLM administrators, no realistic evaluation of impacts will ever appear in a BLM EIS.

p. 157, Conclusion, sentence 3

This statement is very ambiguous. It is certainly true that "no effects would likely be attributable to oil and/or gas production." It is equally true, however, that effects may occur that are unattributable to oil production simply because they occur in an unmeasurable or undetectable fashion. Impacts can occur at times other than when larvae are present. Impacts may occur as a result of mortality among organisms that occur throughout the year but provide food for fish larvae only during the time the larvae are present. The conclusion that larvae will not suffer losses due to spills at times other than when the larvae are present is not substantiated by any scientific references.

p. 159, last paragraph

The ecosystem is not "constrained;" on the contrary, it is very complex --- it is the topography that is constrained. It is imperative for good communication that technical words be used correctly. The BLM/OCS office often seems to have difficulty with using biological terms correctly. We suggest you employ the services of a good biologically trained technical editor during your in-house review process.

p. 161, para. 7, line 2

Insert comma after "quantified"

p. 165, para. 2, line 2

Delete "a" after "from," or "s" from "events" on next line

p. 165, Conclusion, para. 2, line 2

It is not clear to us how the information from the oil spill risk analysis (Appendix D) and catch statistics from Sec.III.B.2.d. (Table III.B.2.d.-5) were used to derive a figure of 13 percent for the shrimp population contained in areas of high spill risk. We would also like to know which shrimp population the draft is referring to and a reference to the method(s) used for estimating the total population from which the 13 percent was calculated. The methodology should either be described in the text or referenced.

p. 168, para. 2 and 3

The deletion of 8,000 acres of trawl grounds may not always have minimal impacts. Often fish concentrate in very narrow bands or specific areas or trawlable ground is restricted. Thus, while this amount may not seem significant in view of the total proposal, it is possible that withdrawl of certain areas not exceeding 2,000 acres could be important.

p. 168, para. 3, line 3

"Restriction" should be plural to agree with verb "are" on following line

p. 168, penultimate para., last 2 lines

Should read "Offshore Oil Pollution Compensation Fund"

p. 170, Conclusion

The statement that the proposed sale would have little or no effect on the commercial fisheries is completely inconsistent with the probable impacts reviewed just prior to this conclusion. On p. 166 the DEIS notes losses to razor clams could result. A "good chance that at least one pollutant event will adversely affect shrimp populations" is noted on p. 165. The probable reduction of crab populations caused by events associated with the proposal is noted on p. 163. And on p. 161 the statement is made that salmon populations could be adversely affected. How can we put any credence whatsoever in a document that fails to maintain any sense of internal integrity?

p. 170, para. 6, line 1

Directly contradicts the first statement under Conclusion at top of page. When two absolutely contradictory statements concerning an issue as vital to us as commercial fisheries appear on the same page, just what are we to believe? How can a document with such glaring inconsistencies be useful in the decision-making process?

p. 170, para. d, sentence 2

Delete entire sentence and replace with: "Avian fauna, especially pelagic birds (alcids) and marine waterfowl, are the species most sensitive to hydrocarbon development."

p. 174, para. 3, line 1

What does the word "commerciable" mean?

p. 184, first paragraph, lines 1 & 2

Delete "are" at end of line 2 and insert "is" to agree with "mortality" in line 1

p. 185, para. 3

Statements referring to effects of oilspills on sea otters and harbor seals indicate a high probability that Sale 60 may result in violations of the Marine Mammal Protection Act of 1972.

p. 191, last 2 paragraphs

We are unclear why this discussion of potential impacts of small boat traffic, including fishing vessels and proposed ferry services, not directly related to, or closely attributable to, OCS development is included here. We believe it an inappropriate discussion better found in a DEIS on the impacts of small boats on cetaceans. Frankly, the entire discussion bears a marked resemblance to the proverbial "red herring" and adds nothing to an objective treatment of OCS-related impacts and the reader's understanding of them.

p. 197, para. 1, sentence 1

Statement is in direct conflict with assertion on p. 170 of low or no

impact to Kodiak fisheries

p. 198, para. 2, line 1

Insert comma after "rates" and delete "of" before "alcohol"
Alcohol abuse is seldom considered a crime by modern clinicians. Alcoholism is now considered a disease by most specialists. This DEIS should reflect this more humane,accurate and enlightened viewpoint.

p. 198, Port Lions, line 4

Insert word "on" between "or" and "nearby"

p. 200, Cumulative Effects, first sentence

We perceive this statement as absolutely untrue. We view Lease Sale 61 as much more important with regard to sociocultural (and other) cumulative impacts. We simply cannot understand BLM's refusal to acknowledge the cumulative impacts associated with Sale No. 61.

p. 202, Conclusion

The fact that many residents of Port Lions view OCS-related growth as desirable should be substantiated. A desire to attract industry should not be construed to mean the community welcomes OCS-related development. See also p. 198 where entire tone of paragraph is misleading to the reviewer.

p. 202, Cumulative Effects

The statement is made that only minor impacts could be expected in Kodiak and Port Lions as a consequence of "cumulative effects resulting from the proposed lease sale and other projects." We contend this statement is untrue. If Lease Sale No. 61 is included among the "other projects" as *it should be, then the* cumulative effects represent a major impact to the Kodiak area.

p. 204, para. 1, line 8

Delete "the" after "of"

Table IV.A.2.h.(4)-1

A similar table for each alternative would be useful for evaluating all development options on a comparative basis.

Table IV.A.2.h.(4)-2

What does the third column, d =, represent?

p. 205, Conclusion

The significant disruption of subsistence opportunities over a long period of time would create a severe hardship on any village so impacted. The full significance of the subsistence life style is lost to the dominant non-Native culture. The Native American's view of life is oriented toward the group as an organic, all-embracing body. A person's identity as part of the group is part of his own individuality. He is this person, and part of him is the fact that he is attached to, belongs to, is part of, this particular group. He behaves as an individual, to be sure, but he behaves with reference to his group attachment. It is as an aspect of the group that subsistence takes on its significance, for the subsistence life style is part of the life of the group, and so is part of what and who a person is. With the disappearance of the old languages and of many practices and beliefs, and with increasing use of goods from the non-Native world, the continuance of a subsistence tradition remains a solid point of identification.
Fish, particularly salmon, and other marine foods are still an integral part of Koniag life. As some other aspects of that life have disappeared, the role of fish and subsistence fishing has assumed even more importance --- both economic and symbolic, and the symbolic may well be the more important of the two. We *view any threat to the subsistence life style of both Native Americans* and non-Natives alike as extremely serious and wish to go on record as favoring only those alternatives and measures that will either remove or reduce such threats to an acceptable level.

p. 207, Port Lions Area, para. 1, line 6

Change "have" to "has" to agree with subject "number" in preceding line

p. 207, Port Lions Area, para. 2, last sentence

The philosophy of increased government spending is not viewed by all persons as a singularly advantageous economic concept to follow.

p. 213, para. 3, line 1

Change "on" to "of"

line 6

Change "on" to "of"

p. 213, para. 4, line 2

Delete "s" from "requirement" to agree with verb "is" on following line

p. 214, last paragraph

Regardless of the legal status of the land, the pipeline would be a de facto adverse impact if built through the wetlands. The impact could only be eliminated by building the pipeline around the wetlands area as suggested and not by simply changing the land use policy or designation. It is somewhat frightening to read that a Federal agency whose very title includes the term "land management" would evaluate the impacts of a project merely on the basis of applied land use designations.

p. 217, para. 2, line 5

"Uncertainties" is misspelled

last paragraph, line 11

"Uncertainty" is misspelled

p. 220, Kodiak Island Exploratory Period, para. 1, line 2

"Would" is misspelled; delete "the" before "Port"

p. 223, para. 1, line 13

"Measurable" is misspelled

p. 225, Conclusion, para. 2, line 1

Change "are" to "is" to agree with subject "conflict"

p. 227, para. 1, line 2

Change 'effect" to "affect;" effects are results, affect means to change

p. 227, last para., penultimate line

The proposal itself has no effects, it is the proposed actions that, if undertaken, may or may not conflict with provisions of the CMPs for either the KIB or the KPB. The proposal, after all, is only a document and, as such, has no impact until its provisions are implemented.

p. 228, para., last line

Strike "er" from "out" and combine with "lying" to read "outlying"

para. 5, line 3

Change "Plats" to "Flats"

p. 232, last para., line 1

"Research" is misspelled

p. 233, Conclusion, line 6

Insert "other" before "aquatic" since fish are a form of aquatic life

p. 233, Unavoidable Adverse Effects

If short term and cumulative effects of contaminant release are avoidable, why not make such strategies a condition of the permit? They could simply be included in Mitigating Measures In Place.

p. 235, para. 3, line 4

Change "of" to "to" preceding "air"

p. 235, last paragraph, first sentence

It would seem such data could be obtained from Valdez.

p. 237

Nowhere in the entire discussion (pp. 150-237) of the environmental impacts of the proposed alternative are the LNG and crude oil tanker routes and delivery terminals and impacts associated with their use addressed. It is as if once the products leave Alaskan waters, no more potential for any impacts, adverse or

otherwise exists. We contend that any construction (e.g. LNG plants) or other actions (e.g. transfer to smaller tankers to pass through Panama Canal) that must take place as a direct or indirect result of this sale must be addressed in this DEIS, 40 CFR 1502.16(a) and (b).

p. 246, para. 3, line 2

We fail to understand how the North Slope Borough suddenly becomes involved with Lease Sale 60.

p. 248, para. 5, Cancel the sale., sentence 2

We believe inclusion of this statement represents a distinct position of advocacy on the part of BLM. The statement is subjective and presupposes that BLM knows what is best for the area. It also includes the thinly veiled inference that any delay will actually be harmful to the region.

p. 249, 5.a., para. 1, line 7

This statement is misleading since one might also argue with equal validity that reduction could include existing leases (5 spills) plus Shelikof Strait (3 spills) for a total of 8 or about 75 percent reduction in risk. Or, one could argue that reducing the probable number of spills for Sale 60 alone from 4 to 1 represents a 75 percent reduction in risk. Since the CI sale risk analysis could not anticipate future sales and, thus, enjoy a reduced risk proportional to the total risk from all sales in the region, how can BLM turn around and say that one or another alternative reduces or increases risk in proportion to all previous sales rather than only to other alternatives in the same sale. Why are State sales not included in the risk analysis? Followed to the extreme, each additional sale would lower the risk of each future spill by some amount, yet BLM has already stated (p. 133) that spills occur independently of each other and that spills are correlated directly with the volume of oil extracted and transported.

p. 250, Cumulative Effects, sentence 2

Nonsensical statement. Regardless of existing risks, deletion of the Shelikof tracts would reduce risk to Shelikof Strait coastal habitats.

p. 251, para. d., line 6

Typo in "days"

p. 252, para. 1, last sentence

Why not? An analysis of risks for inner Marmot Bay and Whale Pass would be very instructive. We suspect the risk is virtually 100 percent.

p. 266, h(2), para. 1, line 5

Insert comma after "conflict"

p. 267, para. 1, line 2

"a" in "areas" should be lower case

p. 280, para. 2, line 1

We fail to understand how consumption of offshore oil and gas (or any oil and gas for that matter) can be considered a long-term use of non-renewable resources. Please explain in the FES.

p. 281, Worst Case Analysis, para. 1

The worst case analysis described in this DEIS is inadequate according to current CEQ regulations (40 CFR 1502.22). While the BLM has prepared a worst case analysis covering endangered cetaceans (p. 281), such an analysis does not meet current regulation stipulations because it only considers effects on endangered whale species. Under current CEQ regulations, however, the worst case analysis must alert the decision maker to the costs of uncertainty beyond just endangered species.

p. 285, line 1

Nonsensical; should read something like:

"that number of breeding animals below which the population cannot fall without becoming extinct under natural conditions" or "that number of animals required to maintain a viable breeding population under natural conditions"

p. 285, line 9

Delete "are" before "low" and insert "is" to agree with "assumption" which is singular

p. 285, Abandonment of Habitat, line 14

Delete "is" after "gas" and insert "are" to agree with plural subject "oil and gas"

Graphic 14, a. population, para. 1

This discussion cites the Koniag as being of "Indian" (Athapascan?) origin This origin is not substantiated by linguists who place the Koniags among a group of people of Eskimo stock called the Suqpigaq. These Pacific Eskimos spoke a language, Sugpiaq, that differs from both Aleut and the Yup'iks to the northwest.

Appendix E, p. 4 and p. 9

Note is made of suction hose with "Camlock Fittings" on p. 4 whereas these fittings are referred to as "Kamlock fittings" on p. 9. Are these, in fact, the same fittings and/or are they interchangable and compatible? A standardized spelling for products would prove less confusing to the layman.

Appendix E, p. 6

Why is the Cyclonet 150 Open Ocean Skimmer stored in Long Beach, California when it is carried on the inventory for Alaska, where oil can hit critical beaches within three (3) days? Has this skimmer ever been tested in 10 foot seas in Shelikof Strait? This deployment also seems inconsistent with the Gulf of Alaska OCS Order No. 7, Appendix C.

Bibliography, p. 3

"Battelle" is misspelled

Bibliography, p. 25

Reference to Stickel and Dieter should come after reference to Stewart and Kennedy

Appendix A, p. 3

Statement re. standard pipe lay barges is repeated verbatim on p. 5

Appendix A, p. 4, para. 7

Again the ugly specter is raised that Alaskan LNG from Lease Sale 60 will not go to U.S. ports to help stem the "energy crisis" but may, instead, be shipped to Japan. We remain firmly opposed to placing our fishery resources and life styles in jeopardy simply to produce foreign exports when the sale is touted as reducing our own need for foreign imports.

Footnotes for Tables A-1 through A-5 do not include costs for transportation.

Appendix B, p. 1, para. 4, line 5

The figure of 68 may be in error, the days are accounted for but no personnel figures are given except the total and, thus, cannot be checked.

Appendix B, p. 1, para. 5, lines 6&7; 9&10 and 12

The explanation of the number of personnel becomes very involved, especially when trying to keep the number of ships involved per rig times rigs used clear. How is the jump from ships to catering services made? The entire section could probably be handled with one table.

Appendix C, Order 1, para. 2, line 4

Strike "of" after "potential" and insert "for"

Order 2, p. 1, para. 1

Why list as "proposed" if the order was made effective in December, 1979?

Order 2, p. 3, penultimate paragraph, line 2

Typo in "obtained"

Order 3, p. 2, line 3

Add "s" to "interest"

Order 4, para. 2, line 3

Strike "being produced in" and insert "producing"

Order 5, p.1, para.1, line 8

Delete comma after "used" and insert comma after "and"

line 13

Delete comma after "equipment"

p. 3, para. 3, line 2

Typo in "modify"

p. 3, last 2 lines & p. 4, first 2 lines

Not a complete sentence

TAMS
TIPPETTS - ABBETT - McCARTHY - STRATTON
A PROFESSIONAL CORPORATION
ENGINEERS

October 20, 1980

Alaska OCS Office
Bureau of Land Management
P.O. Box 1159
Anchorage, AK 99501

Subject: Draft Environmental Impact Statement for Proposed Sale of Oil & Gas Leases from Lower Cook Inlet & Shelikof Strait

Gentlemen:

We at TAMS Engineers, on behalf of the City of Homer, have partially reviewed portions of the subject draft environmental impact statement as it pertains to the Port of Homer Development Plan (TAMS Engrs. June, 1980) and wish to offer the following constructive comments for your use in the preparation of the final report.

Page	Para.	Sentence	Line	Comment
82	1	3	5&6	Delete the words, "not, however," so the sentence reads as follows: "---- the proposed port development plan has been officially adopted by the City of Homer." This comment can be verified with the Homer City Manager, Larry Farnen — telephone 907-235-8121.
82	2	1	2	Delete the words, "230-foot dock and redeveloping the existing 160-foot dock." and re-phrase so the sentence reads as follows:"----- new 220-foot first stage berth, and remove the existing 100-foot dock and construct a new 160-foot second stage berth for an over all new facility 380-foot in length."
82	2	2	3	Delete the word, "double" and substitute in its place the word, "triple".

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Page/Para./Sentence/Line:				Comment
82	3	2	3	Delete the number, "100" and substitute in its place the following: "approximately 600".
82	4	1	1&2	Delete the words, "a 40-foot water depth (MMLW)." and substitute the following: "at elevation minus 40-foot MLLW."
82	4	3	5	Correct the terminology, " 40-foot MMLW" to read as follows: "minus 40-foot MLLW".
82	4	5	7&8	Restructure the sentence to read as follows: "The berth will accommodate major oceangoing vessels on the seaward side and large fishing vessels, the largest class OCS support boats, rig tenders, and State ferries on either the in shore or seaward side.
82	6	3	4&5	The Port of Homer Development is not specifically designed for OCS and the sentence should be restructured to read as follows: "The plan is designed to accommodate all the general requirements of an OCS support base operation:"
Figure III. C. 5. C.-3 following page 82				The Port of Homer Proposed Development Plan shown, is the plan shown in our draft report and does not reflect the final arrangement of certain facilities, such as the Homer Spit Road alignment, ect. We are enclosing a copy of our Final Development Plan for your use in your Final EIS.

If you have any questions pertaining to our comments we would be pleased to discuss them with you at your convience.

Very truly yours,

TIPPETTS-ABBETT-McCARTHY-STRATTON

Wm. S. Bunselmeyer
Project Manager

Encl. Final Plan

cc: Larry Farnen,
Homer City Mgr.

cc: Gary Daily,
Homer Port Dir.

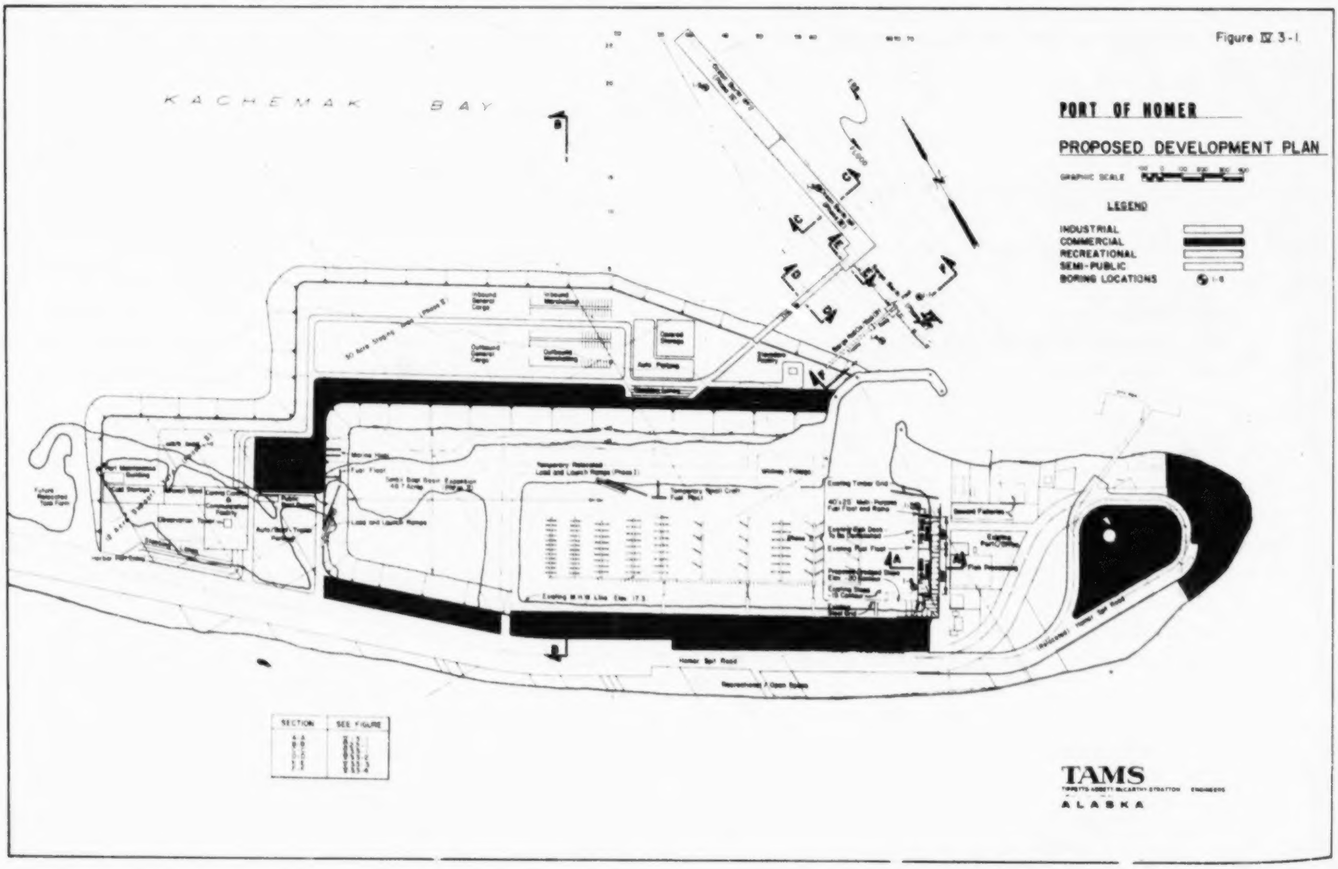

Figure IV 3-1

PORT OF HOMER
PROPOSED DEVELOPMENT PLAN
GRAPHIC SCALE
LEGEND
INDUSTRIAL
COMMERCIAL
RECREATIONAL
SEMI-PUBLIC
BORING LOCATIONS
KACHEMAK BAY
Homer Spit Road
SECTION
SEE FIGURE
TAMS
TIPPETTS ABBETT McCARTHY STRATTON ENGINEERS
ALASKA

FRIENDS OF THE EARTH

2 Mgr.
1 Asst. Mgr.
SE Staff Ldr.
ES Staff Ldr.
PIO
Chief, Ops
2 Chief, EA
Chief, MS
Supv. CA

A-Action
I-Info

23 October, 1980

Ms. Ester Wunnicke, Manager
BLM OCS Office
P.O. Box 1159
Anchorage, AK 99510

Dear Ms. Wunnicke,

Friends of the Earth appreciates this opportunity to comment on the Draft Environmental Impact Statement (DEIS) for the proposed Lower Cook Inlet-Shelikof Strait Oil and Gas Lease Sale #60. In general, we feel that parts of this document represent an improvement over past efforts. Even so, we have noted some rather serious deficiencies. The most outstanding of these is the DEIS's failure to discuss the cumulative impacts of sales #60 and #61 to the Kodiak Island region. This is an issue of grave concern which this document must address.

We are also concerned that the inclusion of Shelikof Strait rather late in the OCS planning process has resulted in insufficient time to fulfill important research needs. Data is particularly inadequate for fish, shellfish, marine mammals, and marine birds. Because of the lack of adequate information, our concern about the living marine resources of Shelikof Strait, the lack of a district coastal plan for Kodiak Island, and the shortcomings of current oil spill clean up capabilities, we do not feel that oil and gas leasing should take place in Shelikof Strait at this time. We recommend tracts 92, 131, and 132 be deleted, and all tracts south of and including tracts 176, 133, 134, and 135 also be excluded.

To minimize impacts on fisheries, marine mammals, and marine and coastal birds in Lower Cook Inlet, we recommend the following tract deletions: 317, 361, 405, 527, 615, 625, 659, 669, 703, 713, 757, and 484.

The following sections deal with our major concerns in the proposed sale area, and the manner in which they were addressed in the DEIS.

Coastal Management Program

Friends of the Earth feels that the relationship between this proposal and coastal zone management is one of the most important issues to be discussed in the DEIS. Both the federal and State governments, through their respective coastal management acts, have recognized the special need to protect sensitive coastal resources while providing for their balanced utilization. The Alaska Coastal Management Program is an expression of this recognition, providing an orderly planning process which identifies sensitive coastal resources and areas which should be protected if and when development takes place.

OCT 27 8 55 AM '80

We appreciate the fact that the DEIS recognizes some of the problems posed by the proposal to coastal planning efforts. For example, the DEIS notes that the only "in place" guidelines for coastal planning are some general goals and objectives which have been adopted as official policy by the Kodiak Island Borough (KIB). Even these general guidelines would indicate that the Shelikof Strait petroleum development scenario is inconsistent with Borough planning objectives.

Even so, the DEIS fails to give adequate emphasis to the seriousness of the problem,particularly for the Shelikof Strait portion of Sale #60. The Kodiak Island Borough has only recently begun their district coastal planning efforts. The DEIS indicates that the KIB plan is scheduled to be submitted to the State for review and approval in late 1981. Given similar experience elsewhere around the state, this will be an extremely difficult schedule to meet. In fact, there are strong indications that the KIB may already be significantly behind schedule in their planning efforts.

If this is indeed the case, the timing of OCS leasing in the Strait could seriously affect the KIB's coastal planning process. One possibility is that in an effort to have something in the way of a coastal plan in place, the KIB could try and do a rush job. Such an effort would undoubtedly have serious flaws which would have to be corrected at a later date.

Another, more likely possibility is that the lease sale and resulting activities would preceed the KIB's coastal planning effort. In either case, a climate of uncertainty would prevail concerning the requirements of the CZM plan. It would seem that it would be in the best interests of all parties concerned, and particularly the lessees, to delay this part of Sale #60 until the KIB plan is more fully developed, and its requirements more clearly defined.

Commercial Fisheries

The proposed lease area has a variety of commercial fish and shellfish resources, which are a major source of local employment for the Kodiak area. In Cook Inlet, the towns of Homer, Seldovia, Ninilchik, and Port Graham also support a large fishing fleet, as well as fish and shellfish processing plants.

More information is needed on fish and shellfish resouces for Shelikof Strait prior to any decision to lease in this area. Available information suggests that major harvest areas for salmon are found along both sides of the Strait, with some of the most abundant catches from the southwest area of Kodiak Island. The DEIS notes that "salmon may be the most vulnerable commercial species in the area affected by the proposal," and that "those streams on the west side of Kodiak Island...could lose entire year classes (of pink salmon)."

Vital areas for herring are Zachar, Uganik, and Ugak Bays on the west side of Kodiak, and the Kukak Bay area on the west side of the Strait. These are also the areas with the highest probable cumulative impacts from an oil spill, according to the DEIS.

The west side of of Afognak and Shuyak Islands, Uganik Bay, Uyak Bay, Kukak Bay, and Wide Bay are important harvest areas for shrimp, and major harvest areas for all three species of crab are found generally along both sides of the Strait. Shrimp and crab larvae are particularly sensitive to oil, as the DEIS indicates. However, the DEIS should also cite a report by Rice et al (1976) that Dungeness crab larvae were apparently attracted to oil slicks, and would repeatedly swim into them until overcome by the toxic effects. The same might be true of other species of crab, and this should be considered in the FEIS.

In addition, on page 162, the DEIS states that "the amount of oil it takes to induce moribundity in larvae...was approximately 2 ppm...Larvae can exist in the moribund stage several days before dying. Larvae do not recover from this stage." While we are glad to see that BLM recognizes that death is permanent, this latter sentence could be deleted from the FEIS.

Another fishery which is only beginning to be utilized in Shelikof Strait is that for bottomfish. Trawl fishermen working in the Strait from Malina Bay south to Chirikof Island have often reported catches of up to 3,960 pounds per hour. A story on the front page of the Daily News last April reported a school of pollock in the Strait that was 70 miles long and 5 miles wide. Shelikof Strait may have the largest single concentration of pollock in the Gulf of Alaska. Because the eggs of many species of bottomfish, including pollock, float near the surface, they would be particularly susceptible to a surface oil spill.

The DEIS discusses a number of potential problems arising from conflicts between oil and gas exploration and development and commercial fishing operations and equipment. The DEIS states that the Fishermen's Contingency Fund will compensate to a maximum of $100,000 for damages to fishing gear and vessels. One

Alaskan crab vessel and equipment may be worth ten times that amount. The Contingency Fund must be increased to cover the actual worth of Alaskan fishing vessels and gear, with funds remaining to cover loss of potential profits due to damages. The fact that the Fund cannot currently do so should be made clear in the DEIS.

Finally, after over 20 pages on the potential impacts of the proposal on fisheries resources and the commercial fishing industry, the DEIS concludes: "The proposed sale will have little or no effect on the Kodiak, Homer, Port Lions, Seldovia, and Kenai commercial fisheries." Given all the preceeding data, this is an absurd conclusion, which should be corrected in the FEIS.

Marine Mammals

One technical problem we noted is that Graphic 11 uses two virtually identical greens to distinguish between sea otter low densities and sea lion pupping/breeding rookery/hauling out areas. It is important to be able to differentiate this information, and a different color or pattern should be used on one of the two. This same graphic also omits a very large sea lion concentration on Latax Rocks, north of Shuyak Island. Calkins (1979) cited a population of 1,164 animals for this area.

The DEIS states that certain aspects of oil development will have an adverse affect on each of the marine mammal species in the lease area. However, we feel that the DEIS tends to cite information, particularly on short term direct effects, that tends to downplay the impacts of oil on marine mammals. For example, it notes a study that says oil did not affect the mortality of grey seal pups. It fails to include such studies as that by Pearce (1970, in Calkins, 1979) who reported that "after the Arrow spill in Nova Scotia, young grey seals were found blundering about in the woods ½ mile from shore, unable to find their way because of oil around eyes and nostrils."

The DEIS notes that short term exposure to oil may "yield relatively minor physiological effects such as eye irritation", but fails to include that eye irritation and nostril damage may prevent sea lions and seals from orienting themselves (Smith and Geraci, 1975) or that parents might not be able to identify the young and would thus abandon them.

The DEIS also cites a study by Kooyman and Costa on the effects of oil on sea otters. It should be noted that although the researchers were "fundamentally unwilling to put enough oil on the otters or to leave oil on the captive otters long enough to endanger their lives (OCSEAP, 1980), two of the five captive otters developed pneumonia, and one died. The amount of oil and length of exposure varied, but 25% covering of crude oil and eight days exposure were the maximum. Kenyon (1972) reported that a thin, iridescent film of oil is sufficient to cause death in sea otters.

In addition to the above corrections for the DEIS, we feel a number of information needs must be met prior to any leasing. These recommendations are based on the work of Mary ellen Spencer in an internship progam sponsered by the University of California at Santa Cruz and Friends of the Earth[1]:

1. Information on distribution, patterns of movement, and breeding populations of sea lions, harbor seals, and sea otters in Shelikof Strait.

2. Documentation of endangered species of great whales in Shelikof Strait, population sizes, and possible breeding activities.

3. Distribution, abundance,and patterns of movement of other cetaceans in Shelikof Strait.

4. Identification of prey species for marine mammals in Shelikof Strait, including distribution, abundance, and variation with the seasons.

5. More information is needed on the direct effects of oil on marine mammals, the ability of marine mammals to detect and avoid oil spills, the effects of possible accumulations of petroleum hydrocarbons in the food chain, the effect of a reduction in prey species, the impact of increased noise and harassment, etc.

In light of the lack of information on endangered species in the area, we do not feel that it is reasonable to assume "the lease sale and exploration activities associated with lease sales 46, 55, and 60 are not likely to jeopardize the continued existence of any of the endangered whales or their habitats." (DEIS, page 192).

Finally, we wish to commend BLM for heeding an earlier request concerning presentation of marine mammal data. In our comments on OCS sale #46, we requested that the limitations of the information presented on the graphics be briefly described, particularly for the endangered species graphic. The expanation on graphic 12 of this DEIS fulfills this need.

Marine and Coastal Birds

Review of the information presented in the DEIS on marine and

coastal birds reveals quite a contrast between the level and quality of data available for Lower Cook Inlet and that available for Shelikof Strait. Based on the work done by Suzanne Easton in an internship sponsored by the University of California at Santa Cruz and Friends of the Earth, we have the following recommendations for additional research in the Shelikof Strait area[1]:

1. Surveys of the Strait itself and the Alaska Peninsula coastal area to determine abundance, distribution, and seasonal variations in marine bird populations.

2. More information on the types of avian habitats found within the Shelikof region, which are the most utilized, and which are the most critical.

3. Determine the location and population size of non-colonial breeding birds, location and size of non-breeding and molting bird concentrations, and the location and size of major wintering populations.

4. More extensive and accurate data is required concerning the size and location of seabird breeding colonies, particularly north of Puale Bay on the west side of Shelikof Strait.

5. Examine the principle prey and feeding distribution, and the seasonal variations in both, for marine birds in Shelikof Strait.

6. Studies to determine whether petroleum hydrocarbons are accumulated in the food webs of marine birds, the impacts of chronic pollution, the impacts of possible reductions in prey items, the sensitivity of various species to noise and disturbance during various stages of life history, and so on.

---

[1] The document produced by this internship was cited by BLM in the DEIS, but was not correctly referenced in the bibliography. The document was produced through a cooperative program of the University of California at Santa Cruz and Friends of the Earth, as mentioned above, and not by the Alaska Department of Fish and Game, as stated in the DEIS.

In summary, we would like to reiterate our concern for the potential impacts of the proposal on the commercial fisheries resources of Shelikof Strait, particularly bottomfish, as well as on marine mammals and birds. In addition, we note the lack of baseline data, absence of a district coastal plan for Kodiak Island, the ineffectiveness of current oil spill clean up technologies, and the dependence of the local people on the living marine resources of the area. For these reasons, we do not believe that any leasing should occur in Shelikof Strait at this time.

Thank you for this opportunity to comment.

Sincerely,

Margie Gibson
Alaska Representative
Friends of the Earth

David Benton
Marine Resources Specialist
Friends of the Earth

Also submitted on behalf of:

Peg Tileston
Executive Director
Alaska Center for the
Environment

Paul Lowe
Chair
Alaska Chapter of the
Sierra Club

Alaska Oil and Gas Association

AOGA

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RECEIVED
OCT 31 1980
BLM
Alaska OCS
Office

October 31, 1980

Mrs. Esther Wunnicke, Director
Alaska OCS Office
Bureau of Land Management
P. O. Box 1159
Anchorage, Alaska 99510

Dear Mrs. Wunnicke:

The Alaska Oil and Gas Association is a trade association whose 29 members are involved in oil and gas exploration, production and transportation activities in Alaska. Our membership includes the largest and some of the smallest petroleum firms in the industry. AOGA is the Alaska Division of the Western Oil and Gas Association.

Attached are our written comments on the Draft Environmental Impact Statement on Sale No. 60, Lower Cook Inlet/Shelikof Straits.

Thank you for this opportunity to comment.

Very truly yours,

WILLIAM W. HOPKINS
Executive Director

Attachment

AOGA Written Comments
OCS Sale No. 60 DEIS
Lower Cook Inlet/Shelikof Straits

General Comment:

The document, briefly mentions the nation's current and projected dependence on foreign oil, and the resultant national economy and security "implications". We feel it is seriously deficient in addressing the need for the sale in terms of real national, state and local benefits. We feel the analysis has failed to consider the need for mininum restrictions and the need for a regulatory climate which encourages the development of small reserves in light of proven technology and minimum potential adverse impacts. Since the estimated resource potential of this area is not as high as compared to some OCS areas there is a need for retaining all tracts in the proposal which exposes maximum acreage and therefore increases the chances of commercial viability.

Comments as they apply to specific sections of the document are provided below.

Summary Sheets (pages i - iv):

The summary sheet for the proposed outer continental shelf oil and gas lease sale #60 identifies the environmental impacts that could occur as a result of oil and gas discovery and development. That discussion includes an outline of risk assessment of features in the environment that would be affected by pollution from a major oil spill event. The probability of oil spill impact is calculated from an oil spill risk/trajectory model which incorrectly assumes a 100% probability of a worst case oil spill. The analysis does not take into account the low probability of occurrence of major oil pollution events in predicting ecological effects. The quantitative difference in the effects of major oil spill events and minor oil spills are not taken into consideration. This needs to be examined especially when one looks at the actual oil spill data of the Upper Cook Inlet development area (see table next page) Oil Spill Volume and Incidence of Spills in Cook Inlet).

TABLE
OIL SPILL VOLUME AND INCIDENCE OF SPILLS IN COOK INLET

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*1974	19	25	268	7	4
*1975	12	3	18	4	3
**1976	52	13 (3)[1]	28	19 (6)[1]	5
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**1980	8	4	55	9 (3)	4
	236	98 (7)	2,265	119 (21)	56

*From BLM, FEIS Lower Cook Inlet Sale (Sale CI)

**This part of the table was compiled by ARCo using records obtained from the U.S. Coast Guard Station in Anchorage, Alaska.

[1] The number in parentheses indicates the # of spill incidents for which there was no volume reported.

On Page ii, the suggestion that the total population of sea otters in the Kamishak Bay and Shuyak-Afognak Island areas would be destroyed as a result of a major spill is not substantiated by the analysis of impacts on marine mammals (IV.A.2.e.). It has been the experience of industry that in general, populations tend to avoid spill areas although individual mammals may be affected.

On page ii, last paragraph "There is a potential for adverse impacts on cetaceans (whales), especially if an onshore facility is located on the eastern shore of Kodiak Island. . ." No connection between onshore activities and whales is made. What effects of onshore development will affect whales? And upon what documentation are any predictions based?

Page iii, states "Port Lions and Ouzinkie would be additionally subject to the effects, undeterminable at this time, of chronic discharges and tankering incidents resulting from the oil terminal facility at Talnik Point." The "chronic discharges" herein referred imply an environmental impact resulting from this activity. But such discharges come under close scrutiny by the U.S. Environmental Protection Agency through NPDES permitting process and the Alaska Department of Environmental Conservation for overseeing compliance with state water quality standards. No degradation of the environment from such discharges is allowed by law. To assume that such incidents would occur with some frequency sufficient to have an environmental effect in the vicinity of an oil terminal does not take into account strict regulatory compliance requirements that currently govern such operations. Experiences at the Alyeska Pipeline terminal and the Drift River terminal refute implications of environmental impacts from 'Chronic discharges".

Pages 25-40, Analysis of the Proposal.

Page 26, Estimated Activity.

The estimated timing of the activity appears to overly optimistic based on historical activities in other areas including the Gulf of Mexico.

Page 27, Mean Scenario.

In reference to the use of pipeline lay barges, the DEIS states that "throughout the proposed lease sale area... waves are generally higher than 1.5 meters". This statement does not agree with data published in the Climatic Atlas of the OCS Waters and Coastal Regions of Alaska by Brower, et al. According to the Atlas, in the proposed lease sale area, significant wave heights are less than or equal to 1.5 meters an average of 88% during the summer, 56% during the fall, 49% during the winter, and 65% during the spring. Most pipelaying operations would be conducted during the summer, when significant wave heights typically are less than 1.5 meters. Although larger lay barges, such as the VIKING PIPER may be used depending on economics, the phrase regarding wave heights should be changed to "wave heights may exceed 1.5 meters" or a similar phrase.

Page 29, Potential Mitigating Measure No. 1.

This mitigating measure would require, where feasible, protection of subsea wellheads, temporary abandonment and suspended operations to

mitigate potential damage to fishing gear. As recognized in the analysis, existing OCS orders Nos. 1 and 3, already provide adequate mitigation and the proposed measure does not provide the economic justification for such a requirement. We recommend this measure be rejected.

Page 30: Potential Mitigating Measure No. 2.

This measure states that pipelines would be required if right-of-way can be obtained, laying the line is technically feasible and environmentally preferable, and if pipelines can be layed without net social loss in the opinion of the lessor. This measure is potentially onerous since the DEIS states this to be more expensive than offshore loading, and that the impact of marine transport could be far less than construction of pipelines. Further, the analysis recognizes the Intergovernmental Planning Program (IPP) which considers local land use, coastal management, environmental data gaps, local socioeconomic conditions, transportation, routing and planning. This part of the proposed measure as stated does not provide the proper flexibility afforded by adequate planning. We recommend this portion of the measure be rejected.

Page 34, Potential Mitigating Measure No. 4

We agree that Potential Mitigating Measure No. 4 on disposal of muds, cuttings, and formation water should not be adopted at least for the reasons given in the analysis. Further, however, this mitigating measure assumes that drill cuttings, muds and produced formation water may have serious environmental impact and may require special handling, including barging of muds and cuttings onshore for disposal. This opinion is voiced in spite of several studies that have been performed to evaluate the dispersion and biological effects of drilling fluids. One such study, Drilling Fluid Dispersion and Biological Effects Study for the Lower Cook Inlet Cost Well, was published by Dames and Moore, April 1978. That study examined oceanographic conditions, drilling fluid releases and dispersion, measures of cuttings, accumulation rates on the seafloor, as well as static bioassays aboard the drilling vessel to determine the sensitivities of important marine species to drilling mud. Live box studies examined the effects of the discharge plume on important species. Benthic community sampling was done before, during and after drilling.

Plume modeling and oceanographic measurements showed turbulence created by the drilling vessel in currents greater than 0.1 knot was sufficient to dilute discharges by a factor of 10,000 to 1 within 100 meters of the point of discharge. The maximum increase in sediment as a result of drilling mud discharge raised the suspended solids by 8 mg/l in an ambient range of 2 to 20 mg/l. Strong currents and extensive reworking of the seafloor sediments prevented the accumulation of cuttings near the drilling vessel. Static bioassays established that pink salmon fry are the most sensitive species tested (others were shrimp, mussels, mysids, and other crustaceans). The lowest 96-hr. LC50 value determined for this species was 3,000 ppm whole drilling mud. No mortalities attributable to effluent-related causes occurred in any live box tests in the effluent plume.

In other words, these studies demonstrate that there is little environmental effect of discharging drilling muds and cuttings into the Lower Cook Inlet during exploration activities. Based on this conclusion, it is no longer prudent to assume that special requirements need to be given for handling drilling muds and cuttings. No stipulation for protection of biological resources is necessary and no precautions for disposal should be stipulated, perhaps with the exception of overseeing the kinds of bacteriocides that are used.

Reinjection of produced formation waters should not be required of the lessee. Disposal of produced waters are sufficiently controlled through the NPDES permitting process. We recommend this measure not be adopted.

Page 34, Potential Mitigating Measure No. 5 Protection of Biological Resources

A report that identifies the environmental features of an area to be explored is submitted with an operation plan filed with the U.S.G.S. Adequate environmental protection is already afforded through agency review of these plans. Additional site specific surveys will result in unnecessary additional cost and time delays without providing significant additional information. We recommend this measure be rejected. In the alternative, biologically sensitive areas requiring additional surveys should be identified prior to the lease sale.

Page 37-40, Summary of Probable Impacts.

The analysis should include the comment from page 131 which says "It should be emphasized that the trajectories simulated by the models represent only hypothetical pathways of oil slicks and do not involve any direct consideration of cleanup, dispersion, or weathering processes which would determine the quantity or quality of oil that could eventually come in contact with targets."

Further we draw your attention to page 154 where it is stated that "The oilspill risks to coastal habitats that are summarized above are actually smaller than the already existing oilspill risks" and "the unavoidable impacts to the coastal habitats are potentially very minor."

Page 38, Bird Species.

The worst case impact such as "some vulnerable bird species indicated in the impact discussion could take as long as 50 years to recover from a single 50 percent mortality event" is unsupported in the discussion on Page 175. Such remarks should be deleted.

Page 39, Impacts on Primary and Secondary Species.

This discussion totally ignores industry experience at Nikiski and Drift River which provides some 15 years of data. This part of the analysis should be rewritten to acknowledge that experience.

Page 40, Impact of Tanker Traffic.

There is no reason to believe that 5 tankers per month to and from any terminal facility could "produce long-term impact of closing nearby fishing grounds". Further, the implied impact is not supported in the discussion on page 222. The statement should be modified or deleted.

Table II. B.2.b.- 1 opposite page 40, Energy Needs.

• This table appears to have two typographical errors. Total Crude Production should read 6.70 x 10^6 and Coal Gasification should read 1.22.

a. Page 48, Description of the Affected Environment.

The DEIS references Graphic 2 for the description of meteorological and oceanographic conditions. The following comments apply to the description on Graphic 2:

1. Skycover - "Fog is the principal cause of reduced visibility, and is most common from December through February and from November through March." This statement is unclear. In addition, data published in the Marine Atlas by Brower indicate that fog is more common during the summer than during the winter.

2. Table III.A.2.b. -2- Annual Maximum Winds and Waves for Selected Return Periods. In making these wave estimates, consideration should be given to the API Recommended Practice for Planning, Designing, and Constructing Fixed Offshore Platforms (API RP2A), which provides a reference level wave height of 60 feet for Lower Cook Inlet.

Page 127, Basic Assumptions (Exploration).

"In paragraph 5, offshore Canada" should read "offshore eastern Canada"

In paragraph 6, "reservoir" should more properly read "mud tanks".

Page 128, Basic Assumptions (Exploration).

In the fourth paragraph, last sentence, "mud discharge" should read "mud system".

Page 128, Basic Assumption (Exploration).

The last sentence of the last paragraph should be modified to read "Most oil-based muds are used for well completions and other special operations such as coring". Oil-based muds are not used to prevent blowouts.

Page 129, Basic Assumptions (Exploration).

Paragraph two contains the following two statements, "Barium sulfate is essentially non-toxic to marine organisms" and "there is concern about products containing barium..... because of the possibility that certain toxics could be released into the environment". We agree that barium is essentially non-toxic and these two contradictory statements should be corrected.

Page 131, Basic Assumptions (Production).

In the last paragraph, daily production of gas should read 464 mmcf.

Page 132, Basic Assumption (Production).

The discussion on produced formation waters shown include disposal to the ocean after treatment.

Page 133, Probability of Oilspills Occurring.

It is stated that statistical distribution for estimating probabilities of oilspill occurrence were taken from studies in 1974 and 1975 and from USGS files of offshore platform accidents. It is obvious that the data does not reflect experiences in the Cook Inlet (see table below). If, as assumed in the analysis, future spill frequencies can be predicted from past OCS experience then the most recent information should be used. Also, the analysis acknowledges that the assumption might be modified by a decrease in future spill rates due to experience and improved standards. We believe the assumption must be modified to account for technology advances and safety practices. It would be much more reasonable to base oilspill probability on industry performance in the comparable area of the upper Cook Inlet, where 13 oil producing platforms have produced 890 million barrels of oil over the past 13 years without a major spill. The current statistics in the Gulf of Mexico OCS and in Alaska demonstrate conclusively that improved technology, industry efforts and government regulations have drastically reduced oilspills from all sources and have essentially eliminated oilspills from blowouts. We therefore must strongly disagree with the assumption that four major oilspills are to be expected over the life of the field for lease sale #60. Further, reference is made to Table 1, appendix D which also shows the expected number of spills from existing sale CI and tankers from upper Cook Inlet. For reasons stated above, and the fact that exploratory activity in CI will most probably cease in the near furure in the absence of a discovery. The figures of 5 spills from CI and 2 spills from tankers are simply not supported. See table, next page.

TABLE

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*From BLM, FEIS Lower Cook Inlet Sale (Sale CI)

**This part of the table was compiled by ARCo using records obtained from the U.S. Coast Guard Station in Anchorage, Alaska.

[1] The number in parentheses indicates the # of spill incidents for which there was no volume reported.

Page 138, Proposed Modifications Based Upon Limited Oilspill Risk.

We agree that areas in the Shelikof Strait are relatively higher risk areas; however, reasonable risk factors based on valid assumption of much lower spill frequencies as suggested above, would already put all surrounding areas below the maximum low risk potential, and are therefore environmentally acceptable under the proposal without modification.

Page 145, Earthquake Hazards.

Ground accelerations ranging from 40-60 percent of gravitational acceleration, as reported by Thenhaus, appear too large. An industry sponsored Offshore Alaska Seismic Exposure Study (OASES), a widely distributed study, indicates much lower values. In addition, the statement that onshore and offshore facilities should be designed to withstand ground accelerations predicted by Thenhaus, et al (1980) should be changed to "Thenhaus et al provide estimates of extreme ground accelerations associated with large return period events". The DEIS should not attempt to establish earthquake design criteria. A complete reference to Thenhaus, et al should be provided for in the Bibliography.

Page 147, Geological Hazards.

We agree that potential geologic hazards in either lower Cook Inlet or Shelikof Strait can be mitigated by adequate compliance with OCS orders and appropriate facility design.

Page 147, Table IV.A.1.g.-1

The Priorities assigned to physical constraints in this table are unclear because it attempts to combine too many elements. As an example, earthquake magnitude is ranked as a high priority constraint on production platforms. It is unclear whether this ranking indicates that earthquakes represent a severe potential hazard to structures, that acquisition of additional information on earthquakes is a high priority need, or that present and future technology is not available to design a structure against earthquakes. The table should be replaced with one that clearly identifies the meaning of the ranking.

Page 151, Oilspills.

For reasons stated above, we strongly disagree with the basic assumption that four major oilspills are likely to occur as a result of the proposed lease sale. The chance of a spill from exploration activity is very low based on past experiences. Recent spill frequencies from other sources, i.e., production and transportation, simply do not support such an assumption. The statement that "oilspills due to blowouts on the U.S. OCS have averaged about 2,000 barrels in size (Council on Environmental Quality, 1974)," needs further analysis. The Geological Survey Circular 741, titled "Oil Spills, 1971-75, Gulf of Mexico, Outer Continental Shelf," (G.S.C. 741), does not support such a statement. G.S.C. 741 does state "Particularly noteworthy is that no spills of more than 50 barrels resulted from drilling operations during 1971-75, even though 4,105 new wells were started. No such spill has occurred since July 14, 1965, when 1,688 barrels of crude oil was discharged into the Gulf during a blowout in the Ship Shoal area off the Coast of Louisiana (An oil blowout which began on March 16, 1969, though technically a non-drilling incident, could be classified with the drilling events. 2,500 barrels was discharged through the tubing.) A later U.S.G.S. report "Outer Continental Shelf Oil and Gas Blowouts" by E. P. Danenberger states that in the 1971-78 period, 7,553 new wells were started; however, total blowout spillage was less than 1,000 barrels. That spillage was from production mishaps.

Page 154, Cumulative Effects.

The stated likelyhood of 11 major oilspills is an overstatement, especially given upper Cook Inlet production and transportation experience, the long history of transport of oil in the Cook Inlet and the fact that development of oil in sale CI is remote.

Page 154, Unavoidable Adverse Impacts.

The .016 percentage spillage rate from tankers (Council of Environmental Quality, 1974) needs further analysis in light of the G.S.C. 741 report. It states "comparison of volume spilled to volume produced for the Gulf of Mexico operations (drilling, production and transportation) during 1971-75 discloses a spillage rate of 0.0028 percent." That percentage was based upon 35,219 barrels produced for each barrel spilled. It further states that "according to the Council of Environmental Quality (1974)" (worldwide) "the historical spillage rate for tankers is 0.016 percent." This statement follows, "this estimate is for tankers of international registry, and it is generally accepted that U.S.-registration vessels have a better record. Furthermore, the development of deep water ports, the application of new regulations restricting tanker discharges, and the application of new technology should significantly reduce the tanker-spillage rate." We can readily reason that the 0.016 percentage rate does not apply to the Gulf of Mexico OCS and most certainly does not apply to the Cook Inlet. Based on EPA and U.S.C.G. data, summarized by the Alaska Division of Oil and Gas and presented in the February, 1976 "Bulletin," it was shown that 49,292 barrels of oil were produced for each barrel spilled from all sources (drilling, production, pipelines and tankers) over the history of Cook Inlet oil and gas activities. This data gives a spillage rate of 0.0020 percent.

We recommend this section of the analysis be rewritten based on more current and applicable data.

Page 155, Acute Effects of Drilling Muds.

The conclusions of this section demonstrate that the toxic components of drilling muds are bacteriocides that are added to the mud to inhibit microbial growth in the mud tanks. These constituents, already diluted in the muds, are further diluted when discharged and "Abundant evidence indicates that lethal concentrations (greater than LD50) of the dissolved fraction of drilling fluid contaminants are only present within a few meters of the discharge pipe." What the comment does not say is that there is little environmental effect from mud fluid discharge and we recommend the analysis so state.

Page 159, Impacts Commercial and Sportfish (conclusions).

For reasons discussed earlier on oilspills, we disagree with the statement "Because of the number of predicted spills, the probability of a spill effecting these species in high". Proper analysis of appropriate data would show the probability to be low .

Page 159, Impact on Salmon Species.

In view of our earlier comments we cannot agree with "... it appears likely that oilspills would adversely effect salmon population levels....." On the contrary, proper use of existing data would show that it is "unlikely".

Page 160, Impacts on Salmon Species.

In the third paragraph, reference is made to "chronic oil pollution sources near major anadromous spawning streams..." Chronic discharge sources will not be located near major anadromous streams.

Page 161, Cumulative Effects.

It is unclear how, if the impact cannot be "well quantified", it can be termed "marginal only if controls are rigorous and accidents average." This statement should be deleted.

Pages 170, Impacts on Commercial Fishing (Unavoidable Impacts).

In discussing impacts such as loss of fishing gear, loss of fishing areas, competition for labor and materials, inability to market fish because of flavor tainting and loss of fishing time because of the proposed sale, the DEIS acknowledges impacts to be "minimal," "relatively minor," "must not be a notable happening," "have minor effects," etc., and we agree. We do not agree that unavoidable adverse impacts will be "moderate" in the Shelikof straits area and should be estimated to be "minor." Further, it does not appear that sufficient consideration was given to the mitigating effect of the Fishermen's Contingency Fund.

Page 172, Disturbance and Displacement of Birds.

We do not agree that there is a major potential for adverse effects from man-made disturbance and displacement of birds from important feeding, nesting and staging areas. Effects of existing activities simply do not support such a finding.

Page 173, Oilspills.

It is stated here "Analysis of the Geological Survey oilspill rajectory model results indicate four oilspills are likely to cur . . ." The U.S.G.S. oilspill model does not predict the number spills but predicts trajectories of spills if they occur at a ecified location. This statement should be changed to reflect that or be deleted.

Page 174, Chronic Oilspills.

It is stated, "Chronic small oil spills are the most likely spills and inevitable in occurrence to a certain degree." The definition of chronic is "continuing for a long time, continuous, constant." As such, the word "chronic" is a totally inappropriate adjective to characterize the "most likely spills" to occur in the Lower Cook Inlet OCS. The Table, Oil Spill Volume and Incidence in the Cook Inlet, presented earlier in our comments, shows the actual types of oil spills that have occurred over the last ten years in the Cook Inlet. This information demonstrates not only the small volume of oil spilled, but also the absence of "chronic" pollutant events. To refer to the typical accidental oil spills that have occurred as chronic pollution events is exaggeration in the extreme. The DEIS further states "Such spills are most likely to be a problem near shore facilities and along tanker routes." Even if such spills are more likely to occur in these areas, the low volume of oil spilled and the infrequency of occurrence that has been observed means that there is no "problem."

Page 176, Impacts on Marine Mammals.

It is stated, "Oil pollution and disturbance due to increased human activity could affect marine mammal populations native to the proposed sale #60 area. Other impact-producing agents which could be associated with petroleum development and production include marine disposal of drilling muds and cuttings, marine disposal of formation and cooling waters, dredging and filling (such as that associated with pipeline construction), and secondary development." Each of these statements is made as a summary, yet the information presented in this section as a whole does not support these conclusions. On the contrary, the evidence presented allows quite opposite interpretations and predictions of impact.

Page 180, Impacts on Marine Mammals (Natural Gas and Gas Condensates).

It is stated "Inhalation of toxic vapors (of natural gas and gas condensates) could be fatal to marine mammals". The purpose of this statement is unclear since just above that statement it is stated "currents, wave action and wind would be expected to disperse, dilute and evaporate gas and gas condensate pollutants rapidly."

Page 185, Unavoidable Adverse Impacts.

A reference is made to ..."the high probability of spills in certain areas . . . ." Even the unwarranted predictions of the analysis for four spills do not support a "high probability of spills" in any area. It is agreed that should a spill occur, habitat and food sources could be affected locally.

Page 185, Impacts on Endangered Species and Non-Endangered Cetaceans.

This part of the analysis tends to ignore available information. Throughout the analysis, there is speculation of major impacts from oilspills and disturbances, yet consultation with NOAA/NMFS as part of this analysis concludes that "the lease sale and exploration activities associated with lease sales 46, 55 and 60 are not likely to jeopardize the continued existence of any of the endangered whales or their habitats." Also, T. P. Dole, Geraci and Smith find that whales co-exist well with OCS petroleum activities. In addition, the analysis acknowledges studies of whales which contacted the Santa Barbara spill in 1969. Those studies showed the number of gray whale strandings were not significantly different from previous years and found no hydrocarbon contamination in those stranded.

Page 210, Cultural Resources (Marine Archeology).
We recommend that justification be given for the blocks identified (red blocks on graphic 13) as requiring special cultural surveys, since we agree with the analysis that there is little potential for the occurrence of cultural resources.

Page 215, Impacts of Gas Pipeline.
III.A.2. is an incorrect reference.

Page 219, Cumulative Effects.
In the fourth paragraph, the third sentence is not completed and the phrase is unclear in meaning.

Page 227, Impacts on the ACMP.
We agree that the proposed sale is not expected to adversely impact the ACMP nor affect the integrity of Kenai Peninsula Borough and Kodiak Island Borough Costal Management Programs.

Page 230, Wastewater Discharges.
Paragraph three discusses the contaminants oil and grease associated with oil-based muds. Since this paragraph is included under the heading of "Types of Wastewater Discharges", it is misleading to discuss oil-based mud systems without indicating that such muds are not discharged into the water column as are water based muds. Therefore, the reference to oil-based muds should be deleted from the paragraph.

Page 230, Produced Waters.
The wording of this paragraph implies that the specifically named heavy metals are present in all formation waters in concentrations exceeding federal water quality criteria. Since this is obviously not the case, the inaccurate statement can be corrected with only minor changes, as follows (changes are underlined): "A review of available data on typical formation water toxic constituents revealed that the Ni, Cd, Zn, and Ag sometimes exceed established federal water quality criteria..."

Page 231, Other Discharges.
The word "treated" should be inserted before each use of the term sanitary wastes.

Page 233, Conclusion.
The third sentence of this paragraph is a conclusion which is not supported by the information presented in this section. The statement that wastewater discharges from OCS activities could contaminate some species surrounding the discharge source is contradicted by the last sentence of paragraph 2 on page 232 which states that in the study done by Tillery (1979) no evidence of bioaccumulation was found. In addition, the contention that these discharges could kill aquatic organisms surrounding the outfall is pure speculation which is unsupported within this DEIS. In fact, paragraph 3 on page 232 it states that in the case of the Cook Inlet COST well, due to the swift currents no cutting accumulations were discernible.

Page 233, Cumulative Effects.
The third sentence of this paragraph states that cumulative loadings of contaminants from various sources could deteriorate existing water quality. Although this statement is qualified with the word" could", based upon the anticipated development described in the DEIS, it is highly unlikely there would be any detectable accumulation of trace metals and petroleum hydrocarbons in the water column. This would be particularly true for a highly dynamic environment such as Lower Cook Inlet.

Page 233, Unavoidable Adverse Impacts.
It appears that the first and last sentences of the paragraph are contradictory.

Table IV A.2.p.-1, back of page 233.
Some of the information contained in this table is unrepresentative due to the manner in which it has been derived- as indicated in footnotes 1 and 3. Footnote 1 states that the emission rates are summed across all sources on the exploratory vessel or production platform. This method of calculating emission rates is particularly erroneous for exploratory vessels since many of the sources would not be operating at the same time.

Footnote 3 indicates that a conversion factor was used which assumes constant daily operations of emission sources over a year. Not only is this a questionable method for computing emissions from a production platform, but it is scarcely appropriate for calculating emissions from a temporary exploratory vessel.

Pages 237-278, Impacts of Other Alternatives.
Comments made above also pertain to the analysis of impacts of all alternatives.

Page 280, Irreversible and Irretrievable Commitment of Resources (Mineral Resources).
The only irretrievable loss of resources is the necessary use of resources associated with unsuccessful exploration efforts to establish the sale area as a commercial hydrocarbon producing area. If exploration leads to a commercially successful development, there would be a net energy gain. It is not accurate to state that the act of extraction of hydrocarbons is an irretrievable commitment of resources when the result is a net energy gain.

Page 281, (Social Factors).
There is little chance of offshore oil and gas activities to change the traditional lifestyles of Kodiak Island and Cook Inlet villages. Social changes in Port Lions, Kodiak and Homer might occur as a result of positive economic change.

Page 281, (Visual and Wilderness Resources).
There is no reason to believe that any wilderness and scenic areas of special significance would be irreversibly committed with the proposal. Many areas suitable for onshore development have already been identified in local borough studies and plans. In addition, industry has been successful in keeping installations neat, painted and well-maintained whether offshore or onshore.

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Alaska District
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October 30, 1980

Bureau of Land Management
Alaska OCS Office
P. O. Box 1159
Anchorage, AK 99510

Written Comments
OCS Sale #60
Lower Cook Inlet - Shelikof Straits

ARCO Oil and Gas Company,
a division of Atlantic Richfield Company
ATLANTIC RICHFIELD COMPANY

G.T. Wilkinson
G. T. Wilkinson, Vice President

INTRODUCTION

In addition to the oral testimony presented by Atlantic Richfield Company at Homer and Kodiak, we would like to comment on the following subjects which were addressed by the Draft Environmental Impact Statement (DEIS):

(1) Oil Spill Data
(2) Impacts on Fisheries
(3) Mitigating Measures

At the outset we would like to make it clear that we fully support the Proposal as identified in the DEIS as Alternative I. Our comments are meant as constructive criticism.

OIL SPILL DATA AND IMPACTS

An oil spill risk analysis is an important part of the DEIS. However, we submit that the analysis of Appendix D should include an analysis of the historical oil spill data and impacts of the area in or surrounding the sale area.

It appears that the data included in Table I was derived from some sort of national averaging over the life of exploration and production in the United States OCS waters. Although this method may have some purely statistical value we question the value of the sole use of such data in this sale on two grounds. First, there have been 15 years of experience of oil and gas activities in Cook Inlet. Second, the operational methods in use in the Cook Inlet are more reflective of the current "state of the art" for the oil and gas industry.

We contend that a DEIS should reflect the historical oil spill data from the area under the study. According to records from the Alaska Department of Environmental Conservation from 1970 to 1979, we can identify only two spills in the Cook Inlet directly attributable to oil and gas drilling, producing, pipeline or tankering activities. Furthermore, both of these spills were under 1,000 barrels, and thus neither would be considered "major" spills as that term is used in the DEIS.

Atlantic Richfield has compiled data from other sources regarding oil spills. For example, Coast Guard records for Cook Inlet indicate numerous spills attributable to the oil industry from 1972 to 1980. However, the volume of all spills combined during this time frame equals 431 barrels. Spills from other sources during this time equalled 460 barrels. Although the data varies somewhat from the data of the Alaska Department of Environmental Conservation it indicates the same general trend. Oil spills in Cook Inlet have historically been very minor and have not come at all close to what is predicted in the DEIS for the future of Lower Cook Inlet.

At the very least, historical data of this kind should be used for comparison against the "national average" especially where such data is readily available. It is evident that the national average is not consistent with the Cook Inlet average and such a comparison should be made.

Furthermore, such a comparison is valid in that the national average is not accurately descriptive of the constantly improving "state of the art." Oil spill prevention methods and equipment have improved greatly in the recent past. We submit that the excellent safety record of drilling and production in the Upper Cook Inlet and of exploratory drilling in the Lower Cook Inlet is a reflection of the improved methods and equipment and increased care with which operations are conducted today.

It seems reasonable that any discussion of oil spills in the Cook Inlet area should consider the data we have ited above. Localized data which reflects the current "state of the art" is probably more valid than using a national average. It provides a more realistic picture of what can be expected. The oil spill probability estimates of Table I, Appendix D of the DEIS are unrealistic, have created confusion and have raised fears to an unnessary level rather than provide an adequate data base from which to draw rational conclusions.

We have one final comment with regard to the treatment of oil spills. We submit for your consideration that it would be beneficial to divide the oil spill discussion into two separate areas - one for the exploratory phase and one for the development/production phase. Drilling practice in Alaska and elsewhere has shown that the danger of an oil spill during the exploratory phase is extremely low. A significant oil spill during the exploratory phase would most likely occur as a result of a blowout. However, even this risk is low and the probability of oil being spilled as a consequence is even lower. We refer you to Open-File Report 80-101, Outer Continental Shelf Oil and Gas Blowouts by Elmer P. Danenbergen, prepared for the U.S. Geological Survey. According to that report, 7,553 wells drilled in the OCS from 1971 to 1978 there were only 46 blowouts, spilling a total of less than 1,000 barrels. Of those 46 blowouts only 17 occurred during the exploratory phase.

Therefore, even using the "national average" for spillage from exploratory well blowouts we find that the risk of such spills during the exploratory phase is negligible (.00225). This information is very significant but is not reflected in the oil spill data cited in the DEIS. To make the "picture" more realistic we suggest that, in addition to the use of historical & local data, significant attention be drawn to the minimal oil spill risks involved in exploratory drilling. We would further cite the rest of Report 80-101 to substantiate our contention that the oil spill data of the DEIS is misleading by failure to accurately reflect the result of modern drilling and production methods.

IMPACTS ON FISHERIES

One of the major items to arise from the DEIS hearing is a concern about the impact on fisheries. The DEIS recognizes this in its statement that "... salmon may be the most vulnerable commercial species in the area to be affected by this proposal." (DEIS p. 159).

It is our position that oil and gas operations in the Cook Inlet area have not significantly affected the salmon catch. The three tables attached to these comments will serve to generally support our position. Table I was compiled by the Alaska Department of Fish and Game and reflects the comercial salmon catch from 1959 to 1978 for the Northern District, General Subdistrict. Almost all the production platforms in the Upper Cook Inlet are located in this area. Table II is from page 152 of the Environmental Assessment of the Alaskan Continental Shelf - Lower Cook Inlet Interim Synthesis Report 1979, prepared by the U.S. Department of Commerce (NDAA) and Interior (BLM) This table shows the salmon catch from 1954 to 1975 for the Kachemak Bay (Southern) District, a very prolific salmon area and an area in which no production platforms located. Table III indicates the salmon catch for all of Lower Cook Inlet from 1954 to 1976 and is from page 151 of the report just cited.

An analysis of these three tables will reveal that the fluctuations in the salmon catch from 1959 to 1978 appear to follow the same general pattern for the Upper Cook Inlet, an area with significant offshore oil production, for Kachemak Bay, an area with no offshore oil production and for the Lower Cook Inlet as a whole. The years of decreased catches in the oil producing area were also years of decreased catches for the area without oil production and for Lower Cook Inlet as a whole. This would seem to indicate that the continuous oil production in Upper Cook Inlet was of little significance in affecting the Salmon catch.

We acknowledge that the analysis just recited may not be scienific, however, it does indicate a general pattern and supports our contention that the fishing industry will not be significantly affected by oil production in the Lower Cook Inlet. We do not intend to be satisfied by this cursory analysis, and we will continue to research and monitor the situation. We do feel, however, that data such as this should be adequately set forth in any DEIS in order that impacts on the fishing industry will not be inaccurately stated or overstated.

Additionally, we would like to state that not all impacts on the fishing industry are negative. Technical Report No. 55 sponsored by the Alaska OCS office states on page 50 that "...fishermen...indicated the vessels (associated with the oil industry) had rescued a number of craft in danger and had been of help in forecasting weather, particularly in the Lower Inlet near the Shelikof Straits." The report states further that as oil activity proceeded exploration and fishing controversies were minimized. We submit that the positive impacts of oil exploration have been inadequately treated in the DEIS.

MITIGATING MEASURES

Potential Mitigating Measure No. 1 -
Well and Pipeline Requirements

ARCo Oil and Gas Company feels that potential mitigating measure No. 1 is unnecessary. This proposed stipulation requires that subsea wellheads and other protrusions be protected in order to allow commercial fishing travel gear to pass over the structures without damaging the fishing gear. To date, no feasible means to adequately protect such structures has been developed.

Regulations currently in place provide a sufficient measure of protection for subsea structure. Gulf of Alaska OCS Order No. 1 requires that all subsea objects resulting from lease operations which could present a hazard to other users of the OCS be identified by navigational markings as directed by the U.S. Coast Guard District Commander. Such markings would enable commercial fishermen to prevent damage to their fishing gear by avoiding subsea structures. Since the potential danger of oil pollution outweighs potential damage to fishing gear if subsea structures are impacted by fishing gear or ship anchors, both the oil industry [illegible] fishing industry should share the burden of ensuring subsea structures remain undamaged.

In the event that the Director of the Bureau of Land Management determines that potential mitigating measure No. 1 be adopted as a lease stipulation, we request that it be amended to read as follows:

> Subsea wellheads, temporary abandonments, suspended operations that leave protrusions above the seafloor and unavoidably irregular pipeline surfaces which are not buried, shall be marked in a manner prescribed by the Distric Commander, U.S. Coast Guard, 17th District. Latitude and longitude coordinates and water depths for these structures shall be submitted to the DCM (Deputy Conservation Manager) and to the District Commander, and shall be published in the Notice to Mariners. In the event that the District Commander determines that such structures could be damaged by fishing gear or ship anchors with resultant oil pollution, he may establish a safety zone around such structures, pursuant to 30 CFR 147.

Potential Mitigating Measure No 2 -
Transportation of Hydrocarbon Products

The transportation of hydrocarbons should be both safe and environmentally sound. To ensure that these criteria are met, any lease stipulation regarding transportation must be sufficiently flexible to allow case by case decisions. The proposed mitigating measure is unnecessarily rigid in requiring pipelines to shore in almost all instances. The possibility of constructing a deep water port facility for offshore loading at Cape Starichkof (identified as suitable for such a facility by a borough sponsored study, DEIS p. 227) would possibly be precluded without consideration due to the measure's stated preference for pipelines.

We recommend that any transportation stipulation be more flexible and suggest the following language:

> Transportation of Hydrocarbons
>
> The transportation of hydrocarbons produced from leased tracts shall be by the safest and most feasible method. In selecting the means of transportation, consideration will be given to: The coastal management plans of the Kenai Peninsula Borough and/or the Kodiak Island Borough (when such plans are adopted and approved pursuant to AS 46.40.010), and the recommendations of the intergovernmental planning program for assessment and management of transportation of OCS oil and gas, affected federal, state and local agencies, and industry.
>
> The lessor reserves the right to require that any pipeline used for transportation of production be placed in certain designated management areas. All pipelines, including both flow lines and gathering lines, shall be designed and constructed to provide for adequate protection from water currents, storms, subfreezing conditions, fisheries trawling gear, and other hazards as determined on a case by case basis . Following development of the transportation system, no crude oil shall be transported by other means except in the case of emergency.

Potential Mitigating Measure No. 3 -
Environmental Training Program

ARCo Oil and Gas Company as a division of Atlantic Richfield Company, adheres to the Company Environmental Protection Policy, which states our objective to "Train our employees in environmental matters, actions and responsibilities relating to their particular assignments". In support of this commitment, ARCo's Alaska Region is currently formulating a cultural/environmental training program which will address concerns mentioned in this mitigating measure.

Potential Mitigating Measure No. 4 -
Disposal of Muds, Cuttings, and Formation Waters

This potential mitigating measure is unnecessary and should not be included as a lease stipulation. This measure was designed for OCS Sale #42, Georges Bank, but is not appropriate for use in the Lower Cook Inlet - Shelikof Strait Area. There is a presumption that disposal of drilling muds and cuttings may have a serious environmental impact. Regardless of the level of dispute on this issue, it is obvious that receiving water characteristics must be taken into account when discussing the impact of discharge from OCS Operations. The degree of resilience of a biome to absorb any level of pollution is necessarily a characteristic of that specific biome. Any lease stipulations should reflect an analysis of conditions and resilience that characterize the Lower Cook Inlet.

Several studies have evaluated dispersion and biological effects of drilling fluids. Atlantic Richfield sponsored such a study, entitled Drilling Fluid Dispersion and Biological Effects Study for the Lower Cook Inlet C.O.S.T. Well (Dames and Moore, 1978). That study examined oceanographic conditions, drilling fluid releases and dispersion, measurements of cuttings, accumulation rates on the seafloor, as well as static bioassays aboard the drilling vessel to determine the sensitivities of important marine species to drilling mud. Live box studies examined the effects of the discharge plume on important species. Benthic community sampling was done before, during, and after drilling.

Plume modeling and oceanographic measurements showed that turbulence created by the drilling vessel in currents greater than 0.1 knot was sufficient to dilute discharges by a factor of 10,000 to 1 within 100 meters of the point of discharge. The maximum increase in sediment as a result of drilling mud discharge raised the suspended solids by 8 mg/liter in an ambient range of 2 to 20 mg/l. Strong currents and extensive reworking of the seafloor sediments prevented the accumulation of cuttings near the drilling vessel. Static bioassays established that pink salmon fry are the most sensitive species tested (others were shrimp, mussels, mysids, and other crustaceans). The lowest 96hr. LC50 value determined for this species was 3,000 ppm whole drilling mud. No mortalities attributable to effluent related causes occurred in any live box tests in the effluent plume.

These studies establish that disposal of drilling muds and cuttings into Lower Cook Inlet will have little environmental effect. Furthermore, there is already sufficient regulation over offshore discharges to protect commercial fisheries. The E.P.A. regulates offshore discharges through the National Pollutant Discharge Elimination System permit process, and OCS Order No. 7 requires that disposal of waste materials generated as a result of offshore operations not adversely affect. among other things, aquatic life. Furthermore at the Washington, D.C. 2974 meeting in July, 1980, there was a formal agreement not to adopt a stipulation such as Mitigating Measure No. 4.

This mitigating measure also contemplates the reinjection of formation waters. ARCo strongly opposes this proposal as it may apply to exploratory wells. Reinjection of formation waters may jeopardize the safety of exploratory drilling operation and may violate the structural integrity of casing strings in such a well.

Potential Mitigating Measure No. 5 - Protection of Biological resources

While the intent of this mitigating measure is laudatory, it is unduly broad and gives the Deputy Conservation Manager wide discretionary powers to alter or halt OCS exploration or development activities without requiring a factual basis for his action. Further, regulations which would have the same effect as this mitigating measure are already in place.

The Amendments to the Outer Continental Shelf Lands Act and regulations promulgated pursuant thereto require Environmental Reports to be submitted with Exploration Plans and Development and Production Plans. These plans must be approved by the Area Oil and Gas Supervisor, Conservation Division of the Geologic Survey, before exploratory or development and production activities are commenced. The Environmental Report for an Exploration Plan must include:

> a description of environmentally sensitive or potentially hazardous areas which might be affected by the proposed exploration activities and a description of the alternatives considered and the action to be taken to preserve or protect such areas. Such areas shall include, but are not limited to, those of cultural, biological (e.g., fisheries), archeological, or geological (e.g., seismic) significance... (30 CFR 250.34-3(a)(1) (iii) 1978)

A similar description is required to be included in the Environmental Report for a Development and Production Plan (30 CFR 250.34-3(b)(1)(ii)(C) 1978)

After the lessee has identified areas of biological significance, the Supervisor is empowered to "suspend any operation, including production, which in his judgement threatens immediate, serious or significant damage to life, including aquatic life..." (30 CFR 250.12(c) 1977). The Supervisor may then require the lessee to conduct site specific studies to determine the potential damage, and to develop mitigating measures to prevent the damage from occuring.

In the alternative, if this potential mitigating measure is to be included as a lease stipulation, we recommend that the first two paragraphs be amended to read as follows:

> If significant biological populations or habitats in the leasing area which may require additional protection are identified by the Supervisor, he may require the lessee to conduct environmental surveys or studies, including sampling as approved by the Supervisor, to characterize existing environmental conditions in an identified zone prior to oil and gas operations, and to determine the extent and composition of biological populations or habitats, and the effects of proposed or existing operations on the populations or habitats which might require additional protective measures. The Supervisor shall provide written notice to the lessee of a decision to require such surveys or studies. The nature and extent of any surveys or studies will be dermined by the Supervisor on a case-by-case basis.

Conclusion

We strongly urge the OCS office to consider these comments and to apply these ideas to the Final Environmental Impact Statement and to future impact statements. The end result of an impact statement should be to present the most realistic expected impacts. The near exclusive presentation of statistical means and modes without treatment of historical local data results in an unreliable image of expected impacts and has served to exaggerate fears and concerns to an extent that has significantly damaged the concept of reasonable and rational approaches to the lease sale controversy.

In these comments we briefly touched on the idea that the word "impact" does not necessarily denote a negative result. To be perceived as a accurate description of anticipated impacts Environmental Impact Statements should devote more attention to the beneficial results of oil and gas exploration.

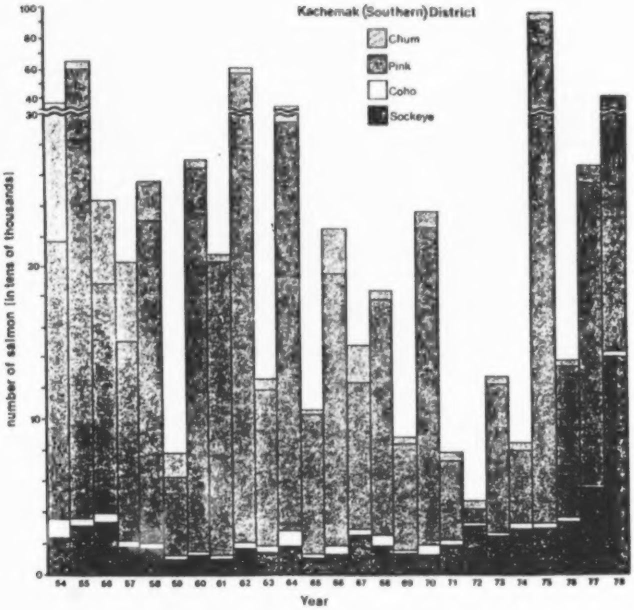
[TABLE 1]

Northern District, General Subdistrict, Catch and Effort, 1959-1978

	Species						Effort	
Year	King	Sockeye	Coho	Pink	Chum	Total	Total Gear 1/	C.P.U.E.
1959	10,577	60,538	27,564	1,631	48,456	148,766	1,061	140
1960	5,527	91,647	113,603	356,866	109,522	677,165	1,138	595
1961	5,065	48,949	34,957	7,557	57,594	154,122	879	175
1962	6,567	80,667	149,324	243,653	125,111	605,322	1,017	595
1963	4,386	54,856	48,131	4,216	41,794	153,383	814	188
1964	78	88,936	138,532	522,565	117,846	868,007	727	1,194
1965	133	11,763	15,422	3,127	16,510	46,955	496	95
1966	1,223	59,881	66,041	312,948	33,348	473,441	575	823
1967	102	58,746	37,223	5,773	37,491	139,335	395	353
1968	268	76,480	134,669	479,210	53,944	744,571	1,616	461
1969	1,581	15,157	18,183	6,224	11,726	52,871	633	84
1970	1,051	34,466	69,122	157,915	22,145	284,699	1,246	228
1971	5,039	21,803	15,592	6,376	15,171	63,981	587	109
1972	2,839	58,520	16,159	80,619	15,980	174,117	847	206
1973	118	29,617	18,499	132,898	28,752	209,884	605	347
1974	113	30,366	41,072	38,504	36,286	146,341	654	224
1975	106	35,304	27,412	76,763	29,894	169,479	653	260
1976	228	39,776	30,364	132,970	13,232	216,570	747	290
1977 3/	511	88,617	15,879	102,570	22,239	229,816		
1978 4/	732	31,731	31,755	297,246	29,709	391,173		
Total	46,244	1,017,820	1,049,553	2,969,631	866,750	5,949,998		
0 Year	2,312	50,891	52,478	148,482	43,337	297,500		
dd Year otal	27,618	425,350	258,862	347,135	309,627	1,368,592		
dd Year	2,762	42,535	25,886	34,714	30,963	136,859		
ven Year otal	18,626	592,470	790,691	2,622,496	557,123	4,581,406		
ven Year	1,863	59,247	79,069	262,250	55,712	458,141		

/ Cumulative total of gear used through season.
/ Total salmon caught per unit of gear-effort.
/ Preliminary figures
/ Preliminary figures

[TABLE 2]



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ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF
LOWER COOK INLET SYNTHESIS REPORT
JULY 1979
U.S DEPT OF COMMERCE (NOAA) and U.S. DEPT OF INTERIOR (BLM)

152.

ALASKA OCS OFFICE
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- ✓ Mgr.
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- Chief, Ops
- ✓ Chief, EA
- Chief, MS
- Supv. CA
- George

A-Action
I-Info

New Orleans, 70139
October 17, 1980

Ms. Esther C. Wunnicke, Manager
Alaska OCS Office
Bureau of Land Management
Post Office Box 1159
Anchorage, Alaska 99510

Re: OCS Lease Sale No. 60
Lower Cook Inlet -
Shelikof Strait

Dear Ms. Wunnicke:

Pursuant to the notice relative to the subject hearings appearing in the Federal Register of August 20, 1980, enclosed is the written presentation of the Alaska Oil and Gas Association. This presentation is included in one binder containing the respective written statements of William M. Meyers, Thomas Cook, L. A. Darsow, and L. D. Gordon, together with a paper prepared by Dr. J. W. Anderson.

It is respectfully requested that the copies of the above listed statements and paper be filed in the hearing record and be made a part thereof.

Yours very truly,

LISKOW & LEWIS

By William M. Meyers

WMM:mb
Enclosure
CERTIFIED MAIL - RRR

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Quarterly Report, Oct-

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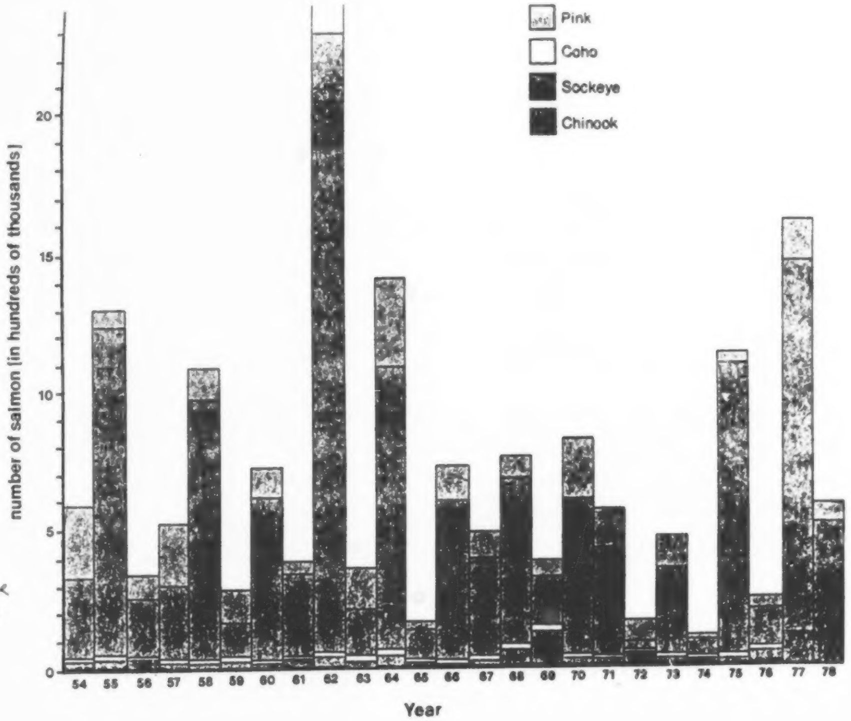

SALMON CATCH IN LOWER
COOK INLET 1954-1978
(FROM ADF&G)

[TABLE 3]

Lower Cook Inlet, 1954

Portions of the written comments submitted by the Alaska Oil and Gas Association are not reproduced here but are available to the public for review at the Alaska OCS Office. The portion deleted comprised the oral testimony given at the Anchorage hearing of William M. Meyers, Thomas Cook, L. A. Darsow, and L. D. Gordon, with a paper prepared by Dr. J. W. Anderson.

KODIAK AREA NATIVE ASSOCIATION
Post Office Box 172 - Kodiak, Alaska 99615 - Phone (907) 486 - 5725

OCS OFFICE
Nov 16 1 12 PM '80

October 31, 1980

Ms. Esther Wunnicke, Manager
Alaska OCS Office
P.O. Box 1159
Anchorage, Alaska 99510

Dear Ms. Wunnicke:

Enclosed are all materials that the Kodiak Area Native Association is submitting in response to the request for written comments on the DEIS issued for OCS Lease Sale #60, the lower Cook Inlet/Upper Shelikof Strait sale. These comments consist of: the oral presentations made by KANA staff members at the Homer and Kodiak DEIS Public Hearings; the summary of the surveys conducted by KANA staff in the villages of Karluk, Larsen Bay, Ouzinkie, and Port Lions; and several additional written comments are not nearly as extensive as anticipated, but staff work loads did not permit a more in-depth response.

We would like to thank the BLM/OCS for the opportunity to respond to the DEIS.

Sincerely,

KODIAK AREA NATIVE ASSOCIATION
IONE M. NORTON, PRESIDENT
Diane for:
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ENCLOSURES

KODIAK AREA NATIVE ASSOCIATION
Post Office Box 172 - Kodiak, Alaska 99615 - Phone (907) 486 - 5725

ALASKA OC
Nov 18

October 30, 1980

Ms. Esther Wunnicke, Manager
BLM OCS Office
P.O. Box 1159
Anchorage, Alaska 99510

Ms. Wunnicke,

This portion of the KANA's written testimony on Outer Continental Shelf (OCS) lease sale #60, will be concerned with results of surveys conducted in four Kodiak island villages. The villages surveyed were Ouzinkie, Larsen Bay, Karluk and Port Lions. Partial results of these surveys were given in oral testimony at the public hearings in Kodiak, on October 15, 1980. There is additional information regarding village attitudes and concerns of lease sale #60 which were not presented at the public hearing. Following this narrative of the survey results, complete analysis for each village are attached.

The surveys consisted of 7-8 questions, varying for each village. The survey was field tested in Ouzinkie. An incidence rating was kept, however the incidence was so high in each village it was not necessary to calculate in the analysis.

Several references are made in the Draft Environmental Impact Statement (DEIS) as to Port Lions' attitude toward oil development and community growth. Pages iii and 39 of the draft indicate that impacts of a major oil terminal facility would be viewed primarily as benefits rather than costs to the community. Port Lions residents were asked how they viewed OCS developments. The majority of people interviewed (42%) did view OCS developments as being beneficial, but this does not reflect their views as to whether they want these benefits through oil development. The KANA survey further probed this, most of the respondents do not want the oil terminal to be built in the Port Lions area. The economic benefits to be gained from oil development could be attained through different means.

This trend of thought was emphasized by the testimony of Dave Wakefield in Port Lions on October 16, 1980. Pages 114 and 117 in the draft refer to Port Lions' community desire to attract new industry and the desire to encourage community growth. Dave Wakefield commented on the fact that Port Lions has expressed a desire to expand the community, but never has the desire been extended beyond fisheries related industry. The attitudes expressed by Mr. Wakefield are reinforced by the survey results. In the attached analysis of the Port Lions survey, the comments supporting a positive attitude toward OCS developments are directed at improvement and economic expansion. These objectives are not directly related to oil development.

Page 207 of the draft draws the conclusion that there would be no unavoidable adverse economic effects for Port Lions. This is based on the statement that "the major impact on Port Lions areas are largely due to permanent employment increases which many would consider benefits rather than loses." We find this statement to not be entirely true. Residents of Port Lions do see the benefits of increased employment as permanent. It could drain the labor force temporarily from fisheries related industry. Since fisheries related industry is a major consideration in their economic exapansion, there very well could be adverse economic effects. This is an area which should be studied more in depth before the Final Environmental Impact Statement (FEIS).

Another statement in question is that Port Lions would respond well to a change of this magnitude (page 198), this refers to the impacts and changes resulting from the proposal. This information is substantiated by talks with a crossection of the community. The survey results show a variety of attitudes toward a change of this size. The majority of respondents were against large community growth. We believe this to be an important variant, and it also should be further pursued before the the Final Environmental Impact Statement. A most important concern is that village attitudes and views be accurately reflected in the FEIS.

Another important factor addressed by the surveys was subsistence. The levels of subsistence in the Kodiak Area Native Association survey for the four villages interviewed ranged from 43% to 76% for one year. We realized these levels are low in comparison with data in the Draft Environmental Impact Statement. It should be noted that levels of subsistence vary depending on the year, time of year and manner in which the question is asked. It would be very difficult to achieve data on a constant level of subsistence. The point is, in every study the level of subsistence is significantly high.

Page 207 of the DEIS states "It appears likely that direct employment and income impacts would be virtually non-existent for Karluk, Larsen Bay, Akhiok, Ouzinkie and Old Harbor." This statement is not correct. The level of subsistence is high in these villages while the level of employment is low. An increase in employment in other areas of Kodiak Island will cause a larger cash flow and possibly inflation. The village natives will not receive the benefit of the cash, but will be affected by inflation. Prices are high as is for the villagers to buy staples, an increase in prices may force them to chose alternatives to their current lifestyle. This alternative would have to include either an additional means of income or a heavier dependence on subsistence than now exists.

On page 39 it is stated "The impacts from oil and gas production and transfer activities on primary and secondary species (and associated habitat) harvested for subsistence purposes within village subsistence use areas cannot be quantified at this time, but are assessed at a high probability of risk from oilspill incidents." Since subsistence and native lifestyles are important factors, these impacts should be quantified. Also impacts from chronic low level pollution should be quantified for these areas.

"An OCS leasing program does not represent a decision to lease in a particular area. It represents only the Department's intent to consider leasing in certain areas, and to proceed with the leasing of such areas only if it should be determined that leasing and development in such areas would be environmentally, technically, and economically acceptable." (page 10) From information and data gathered through the surveys, we question that lease sale #60 is acceptable. Environmentally, subsistence resources are in danger, this in turn definetly affects the economy. Views of village residents directly involved with oil terminal facilities may reflect that this plan is not economically acceptable for their community. These issues should be investigated thoroughly. Since the communities surveyed are those which would be impacted the most in the Kodiak island area, their attitudes and concerns toward OCS lease sale #60 should not be taken lightly. Areas where discrepancy is evident should have further study so they may be adequately and correctly represented in the FEIS.

The second portion of this written testimony will be dealing with the environmental data on the Shelikof Straits. Is is apparent that there is much data still missing in this area. The information lacking is imperative to projecting potential impacts and mitigating measures for lease sale #60. The OCS Lands Act stipulates, that studies must be completed 6 months prior to the lease sale. We refer for example, to the geohazard evaluation of Shelikof Strait. This study will not be completed prior to the sale, only an interim report will be available.

We feel the DEIS has presented the available information on environmental studies very well, and has also conveyed to the public areas where complete environmental data is lacking. Based on the available information, the DEIS presents the impacts of lease sale #60. It is possible, however, that these impacts could be better assessed if all studies were completed at least before the final draft. Following, is a list of areas which are at the present deficient of information enough to make a proper assessment of impacts.

1. an estimated volume of formation waters produced from drilling is impossible due to the lack of knowledge of the subsurface geology of the Shelikof Strait (stated four times in the DEIS: Table II. B.I. a.-1, Table II B.4. a.-1, Table II. B.5.a-1, page 132)
2. at the writing of the DEIS, the United States Geological Survey environmental study of geology had not yet been published (graphic I)
3. only an interim geohazard evaluation of the Shelikof Strait will be available prior to the sale (page 108)
4. the stability of the sand wave field, has been assessed in lower Cook Inlet, there is no mention of data on Shelikof Strait (page 146)
5. there are biological data gaps in Shelikof Strait for finfish and shellfish populations, marine and mammals and cetaceans, marine and coastal birds, and vulnerable coastal habitats. (page 41)
6. there are biological data gaps for discrete ecosystems employed in subsistence-oriented economics (page 47)
7. base behavioral studies are lacking for marine mammal species in lower Cook Inlet and Shelikof Strait (page 178)
8. there is a lack of information of whether or not cetaceans frequent Shelikof Strait.
9. existing data gaps in occurence and distribution of commercial and sportfish species, in relation to different habitat types (page 240)

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10. existing data gaps in occurance, distribution and relative importance of the Shelikof Strait area for marine and coastal birds (page 241)

It is easy to see why environmental impacts are difficult to quantify when so much necessary information is lacking. Without localized biological studies on subsistence species, neither potential impacts or mitigating measures for subsistence use areas cannot be projected. In fact any environmental impacts would be difficult to quantify with the current lack of data that exists.

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TESTIMONY

Of The

KODIAK AREA NATIVE ASSOCIATION

At The

Outer Continental Shelf (OCS)

Oil Lease Sale #60

DRAFT ENVIRONMENTAL IMPACT STATEMENT

Public Hearing

Kodiak, Alaska - October 15, 1980

Presented by:

Wayne Marshall

OCS/Subsistence
Researcher

KODIAK AREA NATIVE ASSOCIATION
Post Office Box 172 - Kodiak, Alaska 99615 - Phone (907) 486 - 5725

October 15, 1980

Ms. Esther Wunnicke, Director
Alaska OCS office
Anchorage, Alaska

Re: Kodiak Area Native Association Testimony Sale #60

Good afternoon Madam Chairperson and Hearing Panel members. My name is Wayne Marshall, and I have been employed as an OCS/Subsistence Researcher by KANA, the Kodiak Area native Association, since October 1, 1979. As outlined by Bill Osborne, KANA OCS Researcher Assistant, at yesterday's Public Hearing in Homer, the KANA is a non-profit organization that was established in 1966. At present, the organization delivers comprehensive manpower, health, education, social service, and community development and planning services to the Native people living on Kodiak Island, particularly those living in the Island's villages.

KANA's efforts to effectively address the potential of OCS oil and gas development in the marine waters surrounding Kodiak Island were heightened in October of 1979 with the receipt of a contract from the Rural Alaska Community Action Program. Through these contract funds, the KANA has attempted to educate, inform, and organize village residents to respond to the potential impacts of OCS development, and has been delegated the responsibility of advocating the positions adopted by the six respective villages to all entities involved in the oil development process. The dictates of this work program have required the KANA to

aggressively utilize a multitude of avenues to provide adequate information to people living in rural, semi-isolated village communities so they are able to make a quality decision in regard to the extremely complex issue of oil development. The effectiveness of this work program effort is severly hindered when the DEIS Public Hearing process allowed the communities on Kodiak Island only 65 days to respond to the DEIS between its release date on August 22nd and the Public Hearings beginning on October 14th. The release of the DEIS in August and the time frame of the response period, posed particular difficulties as it coincided with the last weeks of the salmon season, which most village fishermen participate in, and the opening of the fall king crab season. The KANA would like to state for the record, that it has repeatedly opposed having the DEIS Public Hearings for Sale #60 conducted during this time frame.

However, as the KANA became aware in mid-summer that there were no possibilities to alter the Department of the Interior's pre-lease Sale decision-making process for Sale #60, we accepted the necessity of having to prepare village communities for this critical Hearing during this unrealistic timetable. So the Hearing panel is aware of the process through which individual village decisions were made, I will outline KANA's work program effort between August 22 - October 14. In early August, KANA insured that the DEIS was sent to all villages. For the next two weeks, KANA staff members familiarized themselves with the DEIS and drafted a 10 page synopsis of the Draft. This synopsis was sent or hand-delivered to all village communities between September 10-18.

The KANA staff then initiated travels to the four most directly impacted villages, Karluk, Larsen Bay, Ouzinkie, and Port Lions, to meet with the village's governmental structures, high school classes, and residents to discuss the Sale, the DEIS, and the upcoming Hearing. Following these initial village travels, a second series of trips were made between September 25 and October 10 to conduct surveys in these four villages to obtain an increased awareness of village concerns on OCS development. Ms. Laura Bartels, an OCS Researcher Assistant with KANA, will outline the results of these surveys in her oral testimony before the Hearing Panel this afternoon. At the request of the KANA Overall Economic Development and Planning (OEDP) Committee, comprised of one representative from each of the Island's six villages, the KANA organized a one day OCS information conference in the community of Port Lions on October 2. This conference was attended by 5 (five) representatives from the villages of Karluk, Larsen Bay, and Ouzinkie, ~~and~~ the KANA OEDP Committee member from Old Harbor, the Port Lions City Council, the Port Lions High School classes, and approximately twenty residents of Port Lions. This conference featured presentations by various interests involved in the proposed leasing of the Shelikof Straits/Lower Cook Inlet area. Presentations were made by the Alaska OCS office, State Division Policy Development and Planning, Friends of the Earth, and Atlantic Richfield Company. The conference provided village representatives with the unique opportunities to question all parties concerned with oil development and to meet among themselves to informally discuss Sale #60. The efforts I have just outlined culminated several villages on the Island adopting positions in regard to Sale #60.

At the DEIS Hearings for former Sale #46, the Western Gulf of Alaska Sale, the KANA Board of Directors advocated a No Sale position; a position that had been adopted by the villages of Akhiok, Karluk, Old Harbor, Ouzinkie, and Port Lions. The KANA Board of Directors has adopted no central position for Sale #60, as the four villages that will be most directly impacted by this Sale have expressed differing concerns in regard to the proposed leasing of OCS Lands in the Lower Cook Inlet/Upper Shelikoff Straits. The KANA staff has been directed to inform the Hearing Panel of the various village positions and to elaborate common concerns that underscore these positions. These differing positions should not be interpreted as one village being more or less concerned about oil development than another village, but should be viewed as each respective village's present position in regard to oil development.

At their October 10 Tribal Council meeting, the Larsen Bay Tribal Council adopted Alternative III, the Delay Sale option, as their preferred alternative. This position reflects the Tribal Council's concern that only a minimal understanding of what oil development means to the community of Larsen Bay exists at present. Through the Delay Sale alternative, the Larsen Bay Tribal Council hopes that the intervening two year time period will enable the primary entities involved, federal, state, and local governments, and industry to better inform the people of Larsen Bay as to how oil development will affect their lives.

The Ouzinkie City Council, at their September 25th meeting, adopted Alternative II, the No Sale option as their preferred alternative. This position expressed the village' concerns that the DEIS is inadequate for the purposes of making a decision to lease, that potential negative impacts will occur to the commercial and subsistence resources, and that the village will experience few, if any, positive impacts from this Sale.

The Karluk Village Council, at their October 9th meeting, expressed a preference for Alternative II, the No Sale option. The Council members were concerned that a decision had to be made in a short time frame with what was viewed as a minimally acceptable amount of information. The No Sale position reflected the Council's primary concerns that Karluk and its surrounding commerical/subsistence resources would be subject to all the negatives of oil development, and minimally potential positive impacts.

The Port Lions City Council met on October 13th to consider the question of adopting a formal position on Sale #60. As the Hearing Panel is aware, the DEIS indicated that Port Lions will experience major impacts to its existing lifestyle if the hypothesized oil storage terminal facility is constructed at Talnik point, located approximately three miles from the core of Port Lions. The Port Lions City Council did not adopt a preferred alternative, as the Council decided that no alternative outlined in the DEIS provided an accruate response to the community's concerns in regard to this Sale. Council members and

residents of the community expressed reservations in regard to the proposed leasing of OCS lands in the Shelikoff Straits, and felt that this leasing action would particularly present serious impacts to the commercial fishing/subsistence lifestyle of the community. As a member of this Hearing Panel and an Alaska OCS office staff member will be traveling to Port Lions tommorrow, Thursday, to accept oral testimony from the community, I will refrain from a further discussion of Port Lions' position.

The villages of Akhiok and Old Harbor did not adopt formal positions in regard to Sale #60, as they will experience primarily indirect impacts due to their geographical location on the east side of Kodiak Island. However, the KANA notes that these village communities may be subject to the cummulative impacts of Sale #60 and proposed Sale #61, the Western Gulf of Alaska Sale, that is scheduled to occur in April of 1983.

Although the KANA has not endorsed a specific alternative that is indicated in the DEIS for Sale #60, the KANA has been charged with the directive ~~tions~~ to elaborate on village concerns. One of these primary concerns was cummulative impacts; a concern that KANA staff member Bill Osborne addressed in Homer. A significant oil and gas development activity whcih the DEIS failed to address is the State of Alaska's proposed Lease Sale #35, the State's Lower Cook Inlet Sale. This State Sale is to be coordinated with Federal Sale #60, and is scheduled to be held during the first quarter of 1982, or roughly six month following proposed Federal Sale #60. KANA feels that the BLM is entirely remiss in failing to address the potential cummulative environmental, biological, and social impacts that may occur as a result of State Lease Sale #35.

In considering proposed oil and gas development in the Lower Cook Inlet/Shelikoff Strait region, the KANA notes that the original areas of resource interest for State Sale #35 and Federal Sale #60 were virtually synonymous. This area of resource interest extended from northern boundary of federal lands in Cook Inlet to as far south as the Semidi Islands, an area encompassing all of the Shelikoff Straits. As the Hearing Panel is aware, following the Federal Call for Nominations process, the federal lands proposed for lease now include only the 153 tracts identified in Alternative I. In the Call for Nominations for State Sale #35 released on April 25, 1980, the State narrowed its area of Call to include only on-shore and off-shore tracts north of Cape Douglas - Barren Island region. The State's decision to effectively delete the Shelikoff Straits from the area of Call was primarily based on the comments offered during the Federal Call for Nominations process for Sale #60 by the Kodiak Island Borough OCS Advisory Council and the State Department of Fish and Game. The KANA is curious as to why the State viewed comments offered by a local government body and a State Department as adequate to eliminate all consideration of leasing in the Shelikoff Strait, when the federal government viewed it as necessary to propose these lands for lease.

In additional consideration in conducting Federal Sale #60 in the Shelikoff Straits is that the State may also be able to lease State OCS lands contiguous to several federal tracts without having to follow the State's current 5 year lease sale schedule. If federal tracts number 131,219,263,306, and 737 in the Shelikoff Straits are

leased, the State government will be able to lease the State OCS tracts contiguous to these lands within a one year period of time following the Federal sale action. KANA would like the DEIS to recognize the effects of Federal leasing on potential future State leasing action in the Shelikoff Straits.

The KANA's oral testimony will be supplemented through detailed written comments. Those areas which the KANA will address in written testimony by October 31 include: data gaps in the DEIS for which additional information is needed prior to conducting an oil lease sale; KANA's interpretation of conducting this Sale in compliance with the OCS lands Act of 1953 as amended in 1978; the inadequacies of the Oil Spill Compensation fund and Fisherman's contingency fund to compensate for actual losses; compliance of conducting this Sale in accordance with State policies on Federal OCS leasing during this Five Year Lease Sale Schedule; and proposed mitigating measures.

Nov 1[illegible] 13 [illegible] '80

TESTIMONY
of the
KODIAK AREA NATIVE ASSOCIATION
at the
OUTER CONTINENTAL SHELF (OCS)
OIL AND GAS LEASE SALE #60
DRAFT ENVIRONMENTAL IMPACT STATEMENT
PUBLIC HEARING

KODIAK, ALASKA - OCTOBER 15, 1980

PRESENTED BY:

LAURA BARTELS
OCS RESEARCHER ASSISTANT

Good afternoon, Madame Chairwoman and panel members. My name is Laura Bartels, I am an OCS Research Assistant for the Kodiak Area Native Association (KANA). My testimony will primarily be addressed to the results of surveys conducted regarding OCS Lease Sale #60. Four villages were surveyed: Ouzinkie, Larsen Bay, Karluk, and Port Lions. These villages are located on the north and west sides of Kodiak Island, and are areas of potential impacts if Lease Sale #60 occurs. The desire and approval to conduct these surveys was conveyed to KANA by the councils of all four villages.

The surveys were administered by myself, and two other KANA representatives, Wayne Marshall and Diane Zeedar. The people we interviewed are very diverse in their interests. They represent commercial and subsistence fishermen, residents of small village communities, local government officials, and village corporation members. The corporate members referred to are those who comprise the village corporations formed through the Alaska Native Claims Settlement Act (ANSCA) of 1971.

Methodology used included random door to door and intercept location interviewing. As much as was possible, a balance of positive, negative, and neutral aspects were constant throughout the questionaire. Controls were kept on distribution of sex and age in each village. The number of interviews conducted ranged from 9% to 12% of the entire populations of the villages, and was at least 10% of the adult population in each location.

The first question of the interview asked if the respondent was in favor of the proposed lease sale action. The responses of the people interviewed are as follows:

	IN FAVOR OF	OPPOSED	DON'T KNOW
Ouzinkie	12%	88%	0%
Larsen Bay	21%	79%	0%
Karluk	13%	74%	13%
Port Lions	28%	55%	17%

I would like to point out that the opposition to Lease Sale #60 ranges from 55% to 88%. Even if the 13% and 17% who at the time had not made a decision, have now decided in favor of, the percentages would still be well over 50% for opposition to the Lease Sale.

The reasons given for an in favor of opinion directly correlate to the answers given when all respondents were asked what advantages they saw to the action of Lease Sale #60. Residents stated the advantages of the proposed action as follows:

1. Possible employment development
2. Economic development and improvement to town facilities
3. It would help the national needs
4. Growth would be good for the community - it would provide an expanded tax base.
5. Better rescue operations in the leased area.

It should be noted that in Ouzinkie 53% stated they saw no advantages whatsoever, in Larsen Bay 43%, and in Port Lions 17%.

Another direct correlation was drawn between reasons for opposition and disadvantages which are:

1. loss of fishing space and gear
2. oil spills
3. opposed to community growth - especially from outside sources
4. destruction of environment

5. impacts to subsistence lifestyle too great
6. any employment would be shortterm and would probably require relocation.
7. pollution (noise, air, water, and land)
8. inflation
9. increase in crime
10. no ability to receive compensation for loss of fishery and game resources.
11. state residents would not benefit from the oil produced.

The majority of the village residents interviewed believe the disadvantages far outweigh the advantages. One point of conflict is the viewpoint on community growth. The frequency of this subject mentioned as a disadvantage was much higher than the frequency as an advantage. This raises questions as to the accuracy of statements made in the DEIS on pages 114 and 117, regarding attitudes of community growth and expansion.

To reinforce the previously mentioned attitudes, respondents were asked to rate the alternatives in order of preference. Alternative II (no sale) was the highest rated in all four villages:

Ouzinkie	82%
Larsen Bay	50%
Karluk	50%
Port Lions	41%

The next highest rated alternative was III (Delay sale for 2 years). In Ouzinkie 18% refused to rate more than one choice, in Larsen Bay 7%, in Karluk 25%, and in Port Lions 35%. The majority of these people rated Alternative II as the only course of action.

The DEIS, on page 39, states that "Impacts of a major oil terminal facility on sociocultural systems of Port Lions also would be significant, centering on the effects of competition for scarce community goods and services; those effects are expected to be interpreted primarily as benefits rather than costs to the community." Port Lions residents were asked their opinon on these developments being beneficial to their community, 42% said yes, 34% said no, and 3% at that time did not know. However, the majority of respondents then stated that they would not like to see the terminal built in the Port Lions area. Even though it may be beneficial to the community in some ways, they would rather not have a terminal built at the proposed site. In their views the detriments are far greater than the benefits.

A major issue addressed in the questionnaire was the effects of OCS developments on subsistence resources and native lifestyle. In Ouzinkie 100% felt it would affect their life style, Larsen Bay - 100%, Karluk - 100%, Port Lions - 90%. In the four villages surveyed, the average subsistence levels for one year ranged from 43% to 76%.

When asked how OCS developments would affect their lifestyle, the following areas were mentioned:

1. Removal of the resource from the vicinity due to noise and construction activities, an increase in population would put more pressure on the existing resources, sport hunting and fishing would increase. A depletion of resources along with removal of habitat would force the hunting and fishing out to areas further from the villages.
2. Environmental damage due to oil spills and pollution would cause depletion of the resources.

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3. The land can only support a certain amount of people and maintain an environmental balance. That balance now exists, but if any of the above impacts became a reality the balance would be lost. The existing villages would be forced to break up into smaller groups and relocate if their life style were to continue.
4. If diminishing resources becomes a reality, there would be an increased enforcement of regulations concerning hunting and fishing. Village residents would suffer a loss of existing hunting and fishing rights.
5. Loss of cultural identity: villagers are concerned with preserving their Native cultural identity. If any of the areas mentioned are impacted, part of the Native identity will be lost.

Subsistence is the essence of the Native Lifestyle. All facets are interrelated, you cannot separate one action from the flow of activity without impacts occurring. In the villages commercial and subsistence fishing [illegible] ~~cannot be separated~~. Without the cash flow from commercial fishing, supplies necessary for subsistence activities could not be purchased, nor would they be able to purchase the few staples they do. Without a surplus of some commodity with which to barter, their socio-economic systems would falter. Money is of little consequence in this system, it rarely covers the time, expense, and labor which is put into a project, it only serves to supplement the existing system of subsistence, not control it. Most food hunting or gathering activities are shared with other members of the community. The system is delicately balanced with the environment, any upset in part of the system would contribute to the detrimental impacts to this type of lifestyle.

This lifestyle even includes the choice of place to live one's life. This feeling in the villages is very strong. It was conveyed to me constantly that these people have chosen to live this type of life. There are more conveniences available to these people in larger cities. They do not want them, nor do they want an influx of people changing their community.

These people live where they do in order to live this type of subsistence lifestyle. We are concerned that nowhere in the DEIS is the idea of mitigating measures or reimbursement for a loss of subsistence resources addressed. If a fisherman has had a year or two of bad fishing and his subsistence resources are taxed beyond constraint, he could be economically ruined, not just for that year, but for years to come. He will have to change his lifestyle just to survive a situation which has been forced upon him. How do you compensate an individual for loss of a lifestyle? Inflation is already a problem for the villages, if oil production occurs and more inflation follows, many of these people will be even more dependent on subsistence.

The action which has been proposed in Lease Sale #60 poses too many risks and potential detrimental impacts to the cultural and subsistence resources of ~~these~~ [illegible] villages on Kodiak Island. We are faced with the possibility of endangering and perhaps eliminating a cultural lifestyle on the west side of Kodiak Island. [illegible] ~~which should be protected~~. It is our opinion that the DEIS does not accurately reflect the attitudes of village residents toward ~~oil~~ development and does not address the subject of subsistence resource compensation or mitigating measures adequately.

The KANA will later submit complete analysis of the survey for the four villages and copies of the surveys themselves in written comments to be submitted on October 31.

TESTIMONY

of the

KODIAK AREA NATIVE ASSOCIATION

at the

OUTER CONTINENTAL SHELF (OCS)

OIL and GAS LEASE SALE #60

DRAFT ENVIRONMENTAL IMPACT STATEMENT

PUBLIC HEARING

HOMER, ALASKA - OCTOBER 14, 1980

PRESENTED BY:

BILL OSBORNE
OCS RESEARCHER ASSISTANT

TESTIMONY OF THE KODIAK AREA NATIVE ASSOCIATION AT THE OCS OIL AND GAS LEASE SALE #60 PUBLIC HEARING IN HOMER, ALASKA, OCTOBER 19, 1980

Good evening Madame Chairperson and Hearing Panel members. My name is Bill Osborne, and I am employed as an OCS Researcher Assistant on a short-term contract with the Kodiak Area Native Association, or KANA. In the three years prior to accepting this contract position, I primarily worked with KANA in the areas of Fishery Development and Education. During this time period, I lived in the village of Port Lions for one year and worked as a crew member on a commercial salmon fishing vessel for two summers.

The Kodiak Area Native Association is a non-profit organization of Natives in the Kodiak Island area that was initially incorporated in 1966. KANA's overall purpose is: to promote pride on the part of the Natives of Alaska and their traditions; to preserve the customs, folk lore, and art of the Native races; to promote the physical, economic, and social well-being of the Natives of Alaska; to discourage and overcome racial prejudice and the inequities which such prejudice creates; and to promote good government by reminding those who govern and those who are governed of their joint and mutual responsibilities. To achieve these purposes, KANA undertook work program activities on its first contract in February of 1974. Since these humble beginnings, KANA has developed into a multi-faceted non-profit organization that delivers comprehensive manpower, health, education, social services, and community development and planning services to the Native people on the Island, particulary those living in the Island's six villages.

KANA's focus on proposed OCS oil and gas development in the area surrounding the Island was heightened in October, 1979, with the receipt of a Natural Resources contract from the Rural Alaska Community Action Program. This Fiscal Year 1980 contract and the FY1981 contract which was recently awarded to KANA, have provided funds to educate, inform, and organize village people's concerns on the possible impacts of OCS development, and for KANA to advocate positions adopted by the respective villages to all entities involved in the oil development process. To achieve these objectives, KANA has received program direction from its Overall Economic Development and Planning Committee which is comprised of a representative from each of the six Island villages. This direction has been supplemented with staff travels to villages, distribution of educational newsletters, village surveys, and direct village participation in the decision-making process for OCS development. In this regard, KANA staff and village residents have worked cooperatively with the Alaska OCS Office, the Kodiak Island Borough's OCS Advisory Council, and testified at the public hearings for the Five Year Lease Sale Schedule and the DEIS for the Lease Sale 46. In a continuation of these program efforts, KANA staff and village representatives will be orally testifying at the Public Hearings on the DEIS for Lease Sale 60 in Homer, Kodiak, and the Special Hearing in Port Lions.

The KANA staff and its constituants are very concerned that nowhere in the DEIS is an evaluation given for the cumulative effects of the proposed Lease Sale 60 and Lease Sale 61. Sale area 61, encompassing the eastern side of Kodiak Island, is proposed for lease in April, 1983, less than two years after Lease Sale 60. As mentioned on Page 4 of the DEIS, "If both sales 60 and 61 are held as scheduled, there will be oil and gas exploratory activities on both sides of Kodiak Island. Furthermore, if oil and/or natural gas is found in both sale areas, then production activities for both lease sales would be occurring simultaneously on Kodiak Island." In the section of the DEIS on "Other Major Projects Considered in Analyzing Cumulative Effects," consideration is given to the effects of such projects as the Beluga Coal Field development; the Bradley Lake Hydroelectric Project; and harbor expansion projects in Homer, Kodiak, and Port Lions, but no evaluation is given of the combined effects of Sales 60 and 61. This is because "at a minimum, the Alaska OCS Office would have to know what the Sale 61 resource estimates will be, what the areas of particular interest will be to industry, government, and special interest groups, and finally, what the area selected for further study (e.g., the proposal) will be. As none of this information is presently available, there is no basis on which to make an environmental assessment of the Sale 61 area; hence, no viable assessment of the interrelationship of the two sales is at this moment possible." We simply find this explanation unacceptable.

The process leading up to the now-cancelled Lease Sale 46, which encompassed approximately the same area of call as Lease Sale 61, was followed through the writing of a DEIS in 1977 before the sale was postponed until December, 1980. After the postponement, new scoping sessions were held and a new DEIS was written. Surely after the DEIS process had been followed through twice for the same sale area, the BLM should have some idea of what the resource estimates and the areas of particular interest will be for Sale Area 61, so that the cumulative impacts of Sales 60 and 61 could be considered.

Cumulative effects of Sales 60 and the now-cancelled 46 were mentioned as issues of concern at the two Lease Sale 60 scoping sessions held in Kodiak on August 14, 1979, and March 5, 1980. In fact, the OCS Office implicitly acknowledged that the two sales would jointly affect Kodiak Island by holding an intitial combined scoping session for both Sales 46 and 60 in Anchorage on May 23, 1979. By failing to address these scoping issues, the DEIS falls short of the National Environmental Policy Act objectives. To postpone an evaluation of the interrelationship of Sales 60 and 61 before Lease Sale 60 is held, would sidestep one of the most important issues for Kodiak Island.

It is our belief that Talnik Point was selected as an oil terminal site in order to potentially serve as the receiving point for oil from both sides of Kodiak Island, if oil is discovered in both sale areas. I might mention that Talnik Point is far too close to Port Lions to be considered an enclave site. A concern which was expressed at the March 5, 1980, scoping session was that terminal facilities should be located away from existing villages to lessen community impacts. This concern was not mentioned in the DEIS. The Kodiak Island Borough's 1977 facility siting study also mentioned avoidance of existing community and harbor facilities as a policy assumption for oil terminal siting; and the State of Alaska's 1978 Gulf of Alaska OCS Handbook includes land use compatibility as a siting criterion. If such concerns were to be adequately addressed in this DEIS, then other oil terminal sites more remote from existing communities than Talnik Point should have been considered. The fact that they were not considered again indicates the failure of the DEIS to deal with major scoping issues, demonstrates the failure of the DEIS to follow National Environmental Policy Act objectives, and reconfirms our belief that the Port Lions site was selected because of its convenience for both sales.

On page 24 the DEIS states that the Alternative VI, all natural gas that is produced in the Shelikof Strait would be reinjected. Presumably this is because not enough gas would be produced to warrant piping it to the Nikisky LNG facility on Kodiak Island. However, from the DEIS for Sale 46, we were led to believe that the outer continental shelf on the east side of Kodiak Island is gas prone and that if producible quantities of natural gas were discovered an LNG facility would be built on Kodiak Island. Given the simultaneous development of sale areas 60 and 61, is it not reasonable to assume that if producible quantities of natural gas were found on both sides of Kodiak Island, then an LNG facility would be built on the Island to process the gas from both areas? Simultaneous development on both sides of Kodiak Island would most likely be cost-effective for the oil companies, and might even enhance the producibility of the reserves of each sale area. Once again, the DEIS fails to evaluate the potential simultaneous development of the two sale areas.

The section of the DEIS dealing with cumulative effects of oil spills includes the potential for spills associated with drilling in Sale Area CI and tanker traffic for both CI and Upper Cook Inlet, yet no consideration is given to spills resulting from production and tankering activities associated with Sale Area 61. Petroleum production from Sale Area 61 would increase tanker traffic around Kodiak Island, thus raising the overall average probability of a spill. Production from 61 would increase the probability of spills impacting such "targets" as the Barren Islands, seabird foraging areas, and sea otter concentrations. From the 1980 study of surface currents in Lower Cook Inlet-Shelikof Strait by Gary Huffard, we can assume that oil spilled in the northern portion of Sale 61 could be swept by the Kenai Current through Kennedy Entrance past the Barren Islands, across the mouth of Cook Inlet, and into Shelikof Strait. That such surface transport is possible was demonstrated in 1976 by two drift card recoveries on the west shore of Shelikof Strait and one recovery near Cape Ikolik on Southwest Kodiak Island, all from a single release over Portlock Bank in the northern portion of Sale Area 61. This drift card study was cited in the Kodiak Interior Synthesis Report of March, 1980.

It is reasonable to assume that development activities for the Lease Sales 60 and 61 would be coordinated on Kodiak Island and one might further assume that duplication of shore-based facilities would be minimized. Thus, we might expect that not only would an oil terminal facility or an LNG facility be sited to serve both sale areas, but also roads, airports, harbors, shipping lanes, and pipelines would all be developed giving consideration to simultaneous development in both sale areas. Would this prospect alter the development and production activities as described in the DEIS? Would population and employment increases be different from what is described in the DEIS? Once again the DEIS fails to adequately analyze the overall impact of the proposed lease sale because it does not address at all the cumulative impacts of the proposed lease sale and Lease Sale 61.

We understand that an environmental impact statement is meant to be a decision-making document. As a "best-guess" estimate of the impacts of the proposed action, the EIS should provide the information needed to choose between the proposal or one of the alterntaive actions. This DEIS at best tells us only half of the story.

Since this DEIS fails to present a picture of the combined effects of sales 60 and 61, it is impossible for village communities on Kodiak Island to adequately plan for oil development.

Based on the lack of consideration of cumulative impacts for sales 60 and 61 and on other inadequacies of the DEIS, the Kodiak Area Native Association, speaking on behalf of the villages of Karluk, Larsen Bay, Port Lions, and Ouzinkie, is adopting the position of being opposed to the sale at this time. Additional information on the KANA and village positions will be presented at the hearing tomorrow in Kodiak.

Thank you.

ALASKA OCS OFFICE
NOV 13 [illegible] '80

TESTIMONY
of the
KODIAK AREA NATIVE ASSOCIATION
at the
OUTER CONTINENTAL SHELF (OCS)
OIL and GAS LEASE SALE #60
DRAFT ENVIRONMENTAL IMPACT STATEMENT
PUBLIC HEARING

KODIAK, ALASKA OCTOBER 15, 1980

PRESENTED BY

BILL OSBORNE
OCS RESEARCHER ASSISTANT

TESTIMONY OF THE KODIAK AREA NATIVE ASSOCIATION AT THE OCS OIL AND GAS LEASE SALE #60 PUBLIC HEARING IN KODIAK, ALASKA, OCTOBER 15, 1980

Madam Chairperson and Hearing Panel members, good afternoon and welcome to Kodiak. My name is Bill Osborne, and as I indicated yesterday evening, I am currently employed as an OCS Researcher Assistant by the Kodiak Area Native Association or KANA.

At the public hearing yesterday in Homer I outlined KANA's concerns regarding the inadequacy of the DEIS for OCS Lease Sale #60 in its lack of consideration of the cummulative impacts from Lease Sales #60 and #61. Today I wish to express our concerns regarding oil spill impacts and cleanup capability.

As Wayne just mentioned, KANA has been directed to elaborate on village concerns about the proposed oil lease sale. One of these concerns is the mitigation of oil spill impacts. It is our understanding that the United States Coast Guard does not yet have the capability to contain or clean up oil in waves over six feet, winds over 15 knots, or under icing conditions. Since the weather in the Shelikof Straits often exceeds these conditions for more than three days at a time, spilled oil stands a good chance of reaching shore areas. In order to properly plan measures to mitigate the effects of spilled oil on shorelines, the DEIS should take into account the results of the studies by Miles Hayes concerning coastal morphology and sedimentation in Lower Cook Inlet and Shelikof Strait. These studies identified an Oil Spill Vulnerability Index of ten shoreline types classed according to susceptibility to oil spills. The types range from rocky head lands where reflecting waves tend to prevent any oil from contacting shore, to protected estuarine salt marshes where chemical and biogenic processes must degrade the oil if is to be removed. In salt marshes, oil spills may have long-term deleterious effects with life spans of at least ten years.

The DEIS does include an analysis of potential impact to shoreline segments based on projected oil spill trajectories. However, this analysis would be far more valuable if the level of potential impact to shore segments could be corelated with the Oil Spill Vulnerablity Index, as well as critical spawning and habitat areas, in order to identify the shoreline segments that are most critical for oilspill protection. I might add that maps of the Shelikof Strait coastline classed according to the Oil Spill Vulnerability Index was completed this year and should be included in the DEIS. As Miles Hayes concludes in his 1977 analysis of coastal morphology and sedimentation in Lower Cook Inlet and I quote:

> "Conventional oil spill clean-up procedures cannot be used on a major portion of the most susceptible shorelines (e.g. sheltered rock cliffs, tidal flats, slat marshes). Therefore, efforts should concentrate on preventing oil spills from reaching these areas by the procedures suggested below:
>
> a) Onshore and offshore petroleum facilities should be located with a knowledge if predicted oil spill trajectories (being aware of the many variations possible depending on the tidal stage, wind conditions, ice in the Inlet, etc.) and the susceptibility of the predicted impact area.

> b) Equipment should be designed and procured that will effectively boom off the mouths of the highly susceptible embayments, especially the smaller bays and marsh systems, taking into account the strong tidal currents that exist in most of these areas.
>
> c) This equipment must be locally available (and at the site within hours.)
>
> d) Oil spill contingency plans should be divised and tested in such a way as to assure efficiency under the harsh conditions of climate and currents that exist in the Inlet."

In regard to the inventory and location of oilspill cleanup equipment listed in Appendix E of the DEIS we recommend that suitable oil spill control, containment, and cleanup equipment, be available where oil development activities are occurring, and that the equipment can be deployed within five hours of the convincement of a spill. This equipment should also be able to be rapidly deployed under the severe weather conditions of the Shelikof Straits and Cook Inlet. In particular, we question why the only Cylonet 150 Open Ocean Skimmer is stored on Long Beach, California. Even though the Open Ocean Skimmer is only capable of oil cleanup in seas less the 6 (six) feet, as the best-available current technology, it should be available in Kenai and at a location immediately accessible to Shelikof Strait if the Sale #60 is to be held.

The DEIS indicates that over the life of the field, there is a 98% chance of an oil spill occurring in the sale area. Faced with this virtual assurance of an oil spill, if the lease sale is to be held, mitigating measures reflecting Mr. Haye's recommendations should be included in the DEIS. KANA's written comments will specifically outline recommended mitigating measures.

At a meeting in Kodiak on September 17 and 18 of the Alaska Regional Technical Working Group, several members of the Technical Working Group discussed the possibilities of direct off-shore loading to tankers from platform storage facilities as a mitigating measure to minimize on-shore impacts. This method of transporting oil from the production rigs to tankers for eventual transport to refinery facilities would eliminate the necessities of constructing undersea pipelines from the production platforms to shore and the construction of on-shore oil storage facilities. In short, an oil storage terminal facility at Talnik Point as described in the DEIS would not be necessary. At the October 2nd Port Lions OCS Conference which Wayne referred to, Mr. Richard Knowles, the offshore Drilling Superintendent for ARCO's Alaska Operation, responded to the question of direct tanker loading from existing platforms. Mr Knowles stated that this was a possible production scenario. KANA asks, if offshore tanker loading is technologically feasible for the transport of oil to refinery facilities, why is this scenario not addressed in the DEIS? The environmental resks and on-shore impacts from this scenario are considerable different from those associated with using an undersea pipeline system to transport potential hydrocarbons to shore.

Thank you once again for the opportunity to present the concerns of the Kodiak Area Native Association.

Portions of the written comments submitted by the Kodiak Area Native Association are not reproduced here but are available to the public for review at the Alaska OCS Office. The portion deleted comprises the results of the community opinion poll on oil and gas lease sale 60 of Port Lions, Karluk, Ouzinkie and Larsen Bay.

ALASKA OCS OFFICE
ANCHORAGE, ALASKA
OCT 16 11 24 AM '80

Oliver N. Holm
Box 55
Ouzinkie, Ak. 99644
Oct 13, 1980

Mgr.
Asst. Mgr.
SE Staff Ldr.
ES Staff Ldr.
PIO
Chief, Ops
Chief, EA
Chief, MS
Supv. CA
A-Action
I-Info

Alaska OCS Office
Bureau of Land Management
P.O. Box 1159
Anchorage, Alaska 99510

Dear Sirs,

I would like to enter this letter as written testimony on the proposed Federal sale of oil and gas leases from lower Cook Inlet and Shelikof Strait. My family and I are residents of Whale Is. Our home is approximately six miles NNE of Talnik Pt. We are totally dependant on fishing for our livelyhood. I fish salmon, herring, king crab and tanner crab with a 44' vessel. My wife setnets for salmon at Koker Pt. with the kids. Most of my fishing is done from Uyak to Malina Bay on the west side of Kodiak-Afognak and also in Marmot Bay.

If a facility is built at Talnik Pt. it would have two effects which would jeopridize our livelyhoods. Tanker traffic or barge traffic would be a serious safety risk to us and our crab gear in Marmot Bay and might eliminate nearshore fishing there. Some years nearly a million pounds of king crab and a similar volume of tanner crab are caught in Marmot Bay.

-2-

Chronic oil discharges from Talnik Pt. would be rapididly spread through out Marmot Bay and Kizhuyak Bay and through Whale Pass to Kupreanof + Raspberry Straits by the swift tides + winds. Chronic discharges of oil have a known deleterious effect on larval crab + shrimp. The D.E.I.S statement that Kodiak fisheries are not seriously at risk by the proposed sale is not true! Between Marmot Bay Kupreanof, Uganik, Raspbery, Viekoda Bay and Malina Bay several million pounds per year of crab production could be lost. Also this area plus Kukak Bay on the mainland provides a large + steady percentage of the Islands salmon + herring production. All these areas are shown to be at moderate to high risk of oil polution if tracts in Shelikof Str. are sold. Areas T1 and P1 are particularly important to the larger tanner crab boats as 5 or 6 million lbs or more of tanner crab are caught there each year. Pipelines, drilling discharges, chronic spills, and traffic lanes could combine to eliminate this important fishery.

I favor option V or no sale of P2, P1 + T1, Since there has already been a sale in lower Cook Inlet and facilities already exist there for handling any oil

-3-

that might be found. Instead of rushing to develope all the OCS areas, causing immense impact to the living resources, and then finding ourselves out of oil in 25 years anyway; It would seem much more logical to pace exploration out. Any oil we save for future developement will be vastly more valuable and useful in the future than it would be now. The Federal Government is encouraging a rapid and rash developement of OCS areas in Alaska while discouraging oil developement ashore in Alaska. Onshore drilling is safer and cheaper. Large areas of the North Slope are controlled by the Federal government and are not scheduled for exploration. If there is an overriding National need to drill, why are these areas being withheld?

Pollution control & cleanup capability does not exist that can operate in the sale area under normal conditions. Oil will be spilled and not retrieved. It will impact commercially important species, the entire food chain, the present human population, and the people who consume our products. I urge that a very conservative leasing schedule be adopted.

Sincerely,
Oliver N. Holm
Oliver N. Holm

GILLAS FARMS
STAR ROUTE A BOX 44
HOMER ALASKA 99603
PHONE 235-8964

ALASKA OCS OFFICE
Oct 20 10 35 AM '80

Mgr
Asst. Mgr
SE Staff Ldr.
ES Staff Ldr.
PIO
Chief, Ops
I Chief, EA
Chief, MS
Supv. CA
A-Action
I-Info

[illegible]

20th October, 1980.

Sale 60
Lower Cook Inlet/
Shelikof St

ALASKA OCS OFFICE
ANCHORAGE, ALASKA
Oct 21 11 20 AM '80

Ms. Ester Wunnicke,
Manager,
Alaska OCS Office,
P.O. Box 1159,
Anchorage. Ak. 99510.

Dear Ms. Wunnicke,

My husband and I are in favour of Sale 60 and would like to be put on record as such.

Sincerely,

Aileen B. Kirkpatrick

John and Aileen Kirkpatrick,
Star Route A, Box 42,
Homer. Alaska. 99603.

PAUL L. ENEBOE, M.D.
A PROFESSIONAL CORPORATION
P.O. BOX 194
HOMER, ALASKA 99603
TELEPHONE 235-8585

Oct 21 AM '80

October 17, 1980

O.C.S.
Box 1159
Anchorage, Alaska 99510

Dear Sirs:

I would like to submit written testimony regarding oil lease sale no. 60 in the lower Cook Inlet and Shelikoff Strait area.

I am very much opposed to this sale which includes large areas vital to our fishing industry.

I am not a biologist but I do know that from a biological standpoint that we are just beginning to learn some of the details of our fragile northern ecosystems. Many species of sea life which are commercially important still have life cycles which are not fully understood or known.

For instance, where the various larval stages of a number of shell fish spend their developmental time is still speculation and not really clear. It could well be that the oil drilling would damage an extremely important species and the damage may not even be known or understood for years to come.

I am further opposed to the oil lease sale on a very personal basis. I came to Alaska 15 years ago to escape the destruction and hassle that occurs whenever there is extensive development. I have what I am sure is the unrealistic hope that the oil companies will simply pack up and go away. But before they do so, I hope that their destruction will be kept to a minimum.

Yours,

Paul L. Eneboe, M.D.
Homer, Alaska

PLE:bem

P.O. Box 1901
Kodiak, Alaska
10-18-80

ALASKA OCS OFFICE
ANCHORAGE, ALASKA
Oct 21

Dept. of The Interior, B.L.M.
Alaska O.C.S. Office
P.O. Box 1159
Anchorage, Alaska 99501

Dear Chairperson,

I think the question regarding Proposed Leasing of Shelikof Straits and Lower Cook Inlet is more than just: "To drill offshore or not To drill offshore." Indeed, that's probably the issue in every other spot in the country that is confronting Proposed Leasings. But *here*, the question: "To drill in Shelikof Straits or not To drill in Shelikof Straits." Ever since I've been in the Kodiak area, almost seven years, I have heard the all-Too-True legends of the raging Shelikof. I have looked into the smiling faces of several fishermen who have, since then, died. It is not easy To admit that, in all my moves through five states, I have *never* known so many people who have died in such a short Time period. This fact almost frightens me completely out of this area. Shelikof has its reputation. Shelikof is a word that strikes fear in the hearts of some Kodiakans and strikes up respect in the heart of all of them. *This is* ***NOT*** *Upper Cook Inlet!* Oh, I wish to The Heavenly Father that it was!! I wish *that* every summer when I am setnetting for salmon in Kupreanof and I look out there at Shelikof, and I see that dark shade of water moving my way from Shelikof. I know that the flat calm waters under my skiff at the moment do not stand a chance against that wind moving in from Shelikof. And I never know how hard that wind is going To blow before it will subside. In other words, I never know how long I will have To leave my nets unguarded. When a person is fishing out of an overgrown row boat, he learns not To challenge the weather beyond a point. Sometimes the lesson comes the hard way with a skiff that swamps, an outboard that is submerged, a $2,000 net that is hopelessly Tangled and a load of fish that is lost. Other Times the lesson is learned, but no one is left To Tell it.

My father-in-law's wall is covered with ~~peop~~ pictures of the boat wrecks that he has covered since his Marine Survey business began in 1970. Shelikof has claimed many huge fishing boats, many young lives and some old ones. When conditions are ripe for icing, with wild winter winds and the inevitable wind chill Temperature factor, then the old saying of "The bigger they ~~com~~ come, the harder they fall," applies more than ever. The huge boats' stability is dangerously lost. I wish I could say that gale force and storm force winds are uncommon To the Shelikof. I would like To Tell you that I don't have my Travel plans ruined Time and Time again around here. But I have To Travel a lot between these islands, as I live on Whale Island, 22 miles from the ~~Kodiak~~ Town of Kodiak, I setnet each summer at Onion Bay on Raspberry Island, 40 miles from Kodiak, and I fished roe herring at Women's Bay near The Town. It seems a good day is a rare occurrence around these parts except in summer. Furthermore, Murphy's law seems To prevail here: "Anything that *can* go wrong, *will* go wrong." Just like on the Pipeline, when the Temperature drops, parts and equipment malfunction and fail. I do not believe, therefore, that the Oil Companies are ready for this Shelikof venture. I support a No Sale position. Oil has already been dumped into Kachemak Bay by George Ferris, the oil platform. The Alaskan Track record, that the oil companies boast about is *not* good enough! For Shelikof especially, it must be perfect! There will be extreme difficulty cleaning up a spill when one considers that Shelikof's *average* weather is anything but six foot seas. Shelikof Straits is full of marine mammals and fish, Kelp and shellfish. They will pay for America's greed with their death, perhaps with the destruction of the species

raise the reputation of America in the eyes of the rest of the world. Even Canada looks down on Her, as ANY Alaskan who has been through there can Tell you. We were not at all surprised when the Television carried the story of Canadian belligerence Towards America, during the visit of Canada's Prime Minister To the White House. We even begin To see that America's lost face will *not* be recovered by flexing Her muscle, but rather by reducing Her waistline. For, while Two thirds of the world goes To bed hungry each night, America squanders away her rich food supply in the quest for instantly consumed, non-renewable oil. She sells it To the Teenage boy in California who drives a Van just so he can go To bed with his girlfriends in complete privacy. She sells it To the housewife who owns, among other things, electric curling irons, Hair dryers, portable ovens, and dishwashers. People got by for thousands of years without these things yet we call them part of our "high" standard of living. Yet our ancestors did not seem To suffer so much mental illness and disorders as we do. Indeed, people who revert back To the simpler life report that they have never

I think the Government's idea of gambling with America's Food supply, for the sake of postponing the inevitable end-of-oil period, shows that Uncle Sam believes we will NEVER run low on food. It shows that a low priority is put on seafood and no respect is due to commercial Fishermen. First of all, I believe this country's food supply is heading for trouble. The record-breaking heat wave and the drought shocked the nation. Are not droughts an African phenomenon, or a Middle East problem? No, as we saw, they can boggle the mind with their power. How long can they last? We can only hope they will not persist year after year. We can only hope that the summer was ~~the~~ freak, that the temperatures cannot go higher than that. We can hope the Meteorologists who are beginning to theorize that we are in for a major climate change are wrong, and those who claim pollution is severely changing the weather patterns are mistaken. We can close our eyes to the truth, whatever it might be, because it is painful. We can ignore articles in well-respected National magazines that speak of acid rain. This rain is a direct result of pollution and it brings death, not life, to its lakes, animals, plants, and eventually humans if it goes unchecked. Japan's pollution ~~may~~ is already jeopordizing Alaska's environment. Some pollution in the United States is known to be jeopordizing Canadian environments. A huge cloud of pollution from a city in one state has been found over a huge wheat field in another state. We have one popular presidential candidate who wants more use of coal, less pollution restrictions and laws against the same, and more offshore oil development. It looks like he will win so we must assume, to be safe, that this will decrease the Food supply.

Our population is still growing at an alarming rate. By 1990, there may be 260 million of us or more. We cannot keep the illegal and legal aliens out, and the birth rate exceeds the death rate. Can the food supply keep up? Maybe there's a *glut* on the Food scene today but tomorrow there could be a shortage. After all, that's what the oil companies kept telling us could happen on the oil scene in the world. Don't depend on foreign imports, say the oil companies, for we must be self sufficient! But *why* should we pave the way for dependence on foreign *food* imports by playing Russian Roulette with our seafood resources? We are already hurting our land-food supplies with the tons of toxic waste that we pump into the water supply, thus giving them a chance to get into the grain that feeds the poultry + livestock.

And it doesn't stop there! We are compromising with poisoned food in exchange for a so-called "higher" standard of living.

Country after country is getting the bomb, and more nuclear tests are in store for us. This endangers our food supply. Only two days ago, the Chinese sent us a radioactive air mass the size of the state of California. It went over Washington state, which supplies much of the food to Alaska. I wonder how many such tests we do not hear about. I remember in 1978 turning to a California radio station one night and hearing about a Chinese Nuclear Test with its fallout heading *our* way. *Not one word* was heard or written about it by local media. This happened not once but twice! I can only guess how many other times this happened without my knowledge of it. The newspaper yesterday said that thyroid cancer will increase as a result of Fallout. Iodine is known for being good for thyroid trouble, so perhaps that is why author Adelle Davis wrote in *Lets Get Well* that Kelp protects us against the effects of fallout to some degree. Seafood may have the same result so it would not hurt to protect Kodiak's, Shelikof Straits and Lower Cook Inlet's precious supplies of seafood and kelp. Japan made a fantastic recovery from the World War II bombings, perhaps because their main foods were sea plants and Fish.

Alaska's bountiful supply of seafood is capable of feeding starving nations, both in the present and in the future (ie., America?). Why should we not *save* it? Even Alaska's Governor was looking for a way to get this state's bumper crop of salmon to needy nations so that the market wouldn't be flooded.

We cannot forget Three Mile Island, because it warns us of how close we can come to contaminating millions of tons of food. The lesson is the same: energy pitted against Food and obviously, only one of them can win. Food cannot be the loser for we cannot survive without it! Sometimes America forgets this fact! The Lower 48 states have Nuclear energy plants from coast to coast. Some people think these plants present no major threats, but most people admit they are a threat of sorts. One magazine I read said the radioactive waste is dangerous for 48,000 years. I only hope it's wrong. Is poisoned food in store for our children? At least Alaska's food is still pure!

Another reason I believe our food supply is in trouble is because we hear more and more about how Food producers are in trouble. Without the *incentive* to produce, which is money, they just will stop! East Coast fishermen, Midwest farmers, West Coast farmers all complain about inflation, poor market conditions and industry's negative effects. In the Midwest, huge electrical Towers threaten not only the livestock but "*the people*", yet industry won't budge! On the East Coast, many fishermen expect that their children will choose another profession. Farmers in Oregon Told the same joke that Alaskan fishermen now tell: "A (Farmer) (Fisherman) inherited a million dollars and was asked by the newspaper reporter what he intended to do with it. "Oh" he replied "I'll just invest it in (Farming) (Fishing) until I go broke!"" This spells trouble, I feel sure! Yet for the Food producer To just *downgrade* his operation does not necessary save him, even though he saves money. He won't be able To compete!

All of these factors must be looked at as a composite if we are To get the True picture. They cannot be separated, even though it hurts less when we do that. When even Transportation or lack of it determines whether you eat or not, you know something is amiss. I can't see why we would want To make our selves so vulnerable by chipping away constantly at our Food supply. And we think Foreign "*oil*" puts us behind the Eight Ball?! Wait until it becomes "Food"!

West Coast Farmers in the Seattle and Portland, Oregon areas are waging a quiet but vicious battle with developers who demand To evict them through eminent domain and then put up a bunch of Condominiums or some other Terribly "important" thing in the place of the grazing land, or the Berry farm, or any Type of food producing land that is in the way. The Food producers and their land or water are America's sacred cows, or at least they definitely should be if we are To stay *FOOD* SELF-SUFFICIENT.

Time will not permit me To go much further. I challenge, however, that you Test the Oil Companies' stories of "clean" Track records. I have known a lot of people who put in a lot of hours on the Pipeline, and they can Testify that there was a Tremendous amount of disregard for the environment. On the cover on the book, *Cry Crisis*, is a picture of a caribou being chased by a Pipeline Helicopter. Not only is the pilot breaking F.A.A. laws but he is probably going To run the Terrified animal To death. Enforcement of any law in Alaska has always been a serious problem because it is so vast a state. I remember the story of the prostitute who was reportedly murdered, *thrown over a cliff*, by Union members of Number 798 most Oklahomans. *Nothing* was ever done about that! Another Time (that was, at least, in the newspaper) a white Alaskan bus driver for the Pipeline defended the dignity of a black Pipeline worker against some 798ers who Told him, "Git To the back of the bus, Nigger!" The bus driver was *brutally* beaten and later awarded a huge cash settlement in a lawsuit. Then there's the story Told by Kodiak residents and Former Pipeline workers Paul Harder (owner/operator of the Fishing Vessel Little Raven) and Mike Resoff (owner/operator of the F/V Tasha): the 798ers were so disgusted with the Camp's wringer washers in the laundry room that they threw them out into the grass, thus ruining them completely. The 798ers wanted *fancy* washing machines only, so they threw an expensive Tantrum! Another Time, they put up a sign over their lavatory saying, "Off limits To anyone but 798ers." When one Alaskan came in, they started To threaten him so they were calmly Told that the Alaskan had a Brown or Black Belt in karate. The Oklahomans backed off.

I have been in Fairbanks and Anchorage restaurants where I have heard people with deep Southern drawls shouting ethnic slurs and obsenities at not only Blacks but Alaska Natives. In the Fairbanks restaurant, I remember that my life long Alaskan, half Norwegian husband (who looks and acts like he just stepped off of a Viking ship!) Told the racist To SHUT UP! Another Time, in the Anchorage restaurant, I Told the racist that he needed a rabies shot. So for you To mix head-strong Alaskans with Oklahomans and other deep Southerners is like mixing ammonia and Purex. There is going To be an explosion, I guarantee You. A 25 year resident of Oklahoma and Texas, who is now living up North off and on, Told my husband and I that a lot of the Roughnecks who work the Rigs up here will be ex-cons. He said the Fishermen won't stand a chance against them, as though he expected riots all the Time. I hope he is not telling the Truth, but after hearing the Pipeline stories, I believe him. So I demand To know: who will pay for the increased need for Mental Health, alcoholism Treatment and Police services?

There is so much more I want To say, but Time and the lack of a post office on my very isolated island home makes it impossible. Please hear the plea of the alternative energy enthusiasts: the *Mother Earth News* magazines carry many articles on methane which is easily and inexpensively produced and can even power *T.V. sets*! This magazine believes the electric car is not far away at all from perfection. If only *one* coal oil lamp replaced one electric lamp in every home in America, the energy savings would be phenomenal. I use Aladdin kerosene (coal oil) lamps *exclusively* and they put out the light of an approximately 80 watt bulb! They are not expensive nor dangerous. Please support a NO SALE stand for the Proposed Leases in Shelikof Straits, at least, but I do not feel Lower Cook Inlet should be gambled on either. The stakes are Far Too high.

Sincerely,
Teresa Holm
F/V Teresa H.
Box 1901
Kodiak, Alaska
99615

P.S. Please check with former Pipeline, etc. workers before you believe the Oil company claims to "clean Track" records. I have heard lots of stories of unreported and ignored oil spills. The safety standards were not adhered to either. That is mostly why former Pipeline worker and Alaska Native (Kodiak Aleut) Joe Darling, who was in his early thirties, is no longer alive Today. Please Talk to his widow if you can. She is, as far as I know, still in Kodiak.

ALASKA OCS OFFICE
OCT 23 10 46 AM '80

10-21-80

Bureau of Land Managment
OSSOffice
701 C St.
Anchorage, Ak. 99510

Gentlemen:

I would like you to know that the fishermen and conservationists in Homer DC NCY speack for this 41½ year resident of Homer, nor my family.

Homer has never had a robust economey and except for fishermen, we have had to scrape for a living. We cannot all be fishermen. How can you morally alow the fishermen to harvest "their" natural resource wealth and deny the rest of us citizens the right to harvest our share of the resources, via oil development?

A thpusand years after the oil is extracted Homer will still be a lovely country to live in so the time has come for the country to use its' resources.

The people against oil development are those who have found a comfortable life-style here and are afraid if to many people find this haven it will be spoiled. Well, their comming here has not changed the scenery nor will the next one thousand people change it and we do have the room and should be willing to share it.

Sincerely;

B.E. Uminski

B.E.Uminski
Box 1258
Homer, Ak. 99603

SRA Box 37A
Homer, AK 99603
Oct 21, 1980

ALASKA OCS OFFICE
OCT 24 9 56 AM '80

U.S. Dept of Interior
Alaska OCS Office
Re: Oil & Gas Lease Sale # 60

Dear Sirs:

I am writing to express my opposition to the Oil & Gas Lease Sale # 60. My family and I, and many of my friends and neighbors have been enjoying a new way of life here in the Homer area. We have been working hard to build our homes, cultivate gardens, develop individual crafts and businesses and harvest the resources of land and sea. Clams, Halibut, Salmon and Crab provide most of the protein for our family. Our chief form of relaxation is spending time on the water, exploring beaches, and gathering the foods provided by the sea. Our daily inspiration comes from the wildness and beauty of these unspoiled surroundings. This Lease Sale is threatening to our environment as well as the fishing - tourism economy and the subsistence way of life. Leave the oil in the ground for a national emergency. The time may come when the self reliance and ingenuity of the "homesteader" will be more valuable to our nation than these last few drops of precious oil.

Sincerely
Carolyn Johnson

Manley Terminals, Inc.
COMPLETE FREIGHT SERVICE
MOVING & STORAGE
OCEAN DRIVE & FAA SPUR ROAD
BOX 955 HOMER, ALASKA 99603

JAMES C. MANLEY
PRESIDENT

(907) 235-8535
(907) 235-8536

ALASKA OCS OFFICE
OCT 24 9 53 AM '80

October 20, 1980

Sale 60 Lower Cook Inlet-Sheilikof Straight
Ms. Ester Wunnicke, Manager
Alaska OCS Office
P.O. Box 1159
Anchorage, Alaska 99510

Dear Ms. Wunnicke:

This letter is in support of Sale 60. I like others in Homer who for obviour reasons did not appear at the hearing to support the proposed sale have elected to support it in writing.

I am the president of Manley Terminals Inc. Our business is trucking and warehousing. Our company supports both the fishing and the oil industries. Over the years, I have had an excellent opportunity to witness the drilling and service boat operation working out of the port of Homer. I have also witnessed an attitude change by the fisherman of this area during the last few years.

Since the last sale hundreds of tons of freight for the oil industry have transited our terminal and the port of Homer. Many people have been directly in support of the oil industry in Homer and have economically benefitted from their operation: trucking, longshoring, port income, hotels, airlines, helicopter service, carpenters, garages, welding, grocery stores, medical, rentals, restaurants, taverns, and too many others to enumerate.

In addition, several fishing boats have been employed in support of the oil drilling and geophysical work. Even the tourist boats capitilize by taking tourists to see the drill rigs. On several occassions service boats have rescued fisherman and towed their boats to shore. This is prime reason most fisherman did not protest this sale. They quietly support it.

Since my affiliation with the oil industry I have found them to be extremely environmentally conscience. I know of no case where there has been an adverse environmental incident since the 1977 sale. The industry is generally accepted and appreciated for economic value to the community through special grants to local programs such as contributing to the volunteer firemens fund.

Sincerely,

JAMES C. MANLEY
President/General Manager

JCM: tj

I am opposed to Oil and Gas Lease Sale #60. I believe that it would adversely affect my lifestyle and quality of life. The biological evidence presented in the EIS statement is of poor quality and makes me think that at least that part of the EIS statement represented a cursory effort on the part of the government.

Derek Stonorov

DEREK STONOROV
SRA BOX 44-B
HOMER, ALASKA
99603

ALASKA OCS OFFICE
OCT 24 9 51 AM '80

Oct. 22, 1980
PO Box 2608
Homer, AK 99603

ALASKA OCS OFFICE
ANCHORAGE, ALASKA
OCT 24 9 51 AM '80

O.C.S. Office:

This letter may be late for I have heard two different dates for the deadline for responses concerning oil drilling in the lower Cook Inlet and an oil port facility on the Homer Spit

I am against oil development in the lower Cook Inlet because of the possible danger it will impose on marine life and the wilderness beaches of the Kenai Penninsula. One chance in a thousand is two great a risk for me.

The second reason for my opposition is the definite impact the oil port facility will have on the economy and special lifestyle of Homer. Oil developers come in with the flow of oil and leave when the wells are dry. Oil attracts fast money mentalities, greed, and all the related parasites that I find incongruent with the special nature of life in Homer. When the oil is gone it is the people who remain, the people who came and decided to stay regardless of oil and fast money, the people who cherish beauty for its own intrinsic value, these are the people who will make the sacrifice in losing something irretrievable, something out of memory in much of the world. For a few years of oil I find the disadvantages and risks too great a gamble. I want to keep oil out of Homer.

Sincerely,
Edward Taylor

ALASKA OCS OFFICE
ANCHORAGE, ALASKA
OCT 24 9 46 AM '80

Oct. 21, 1980

U. S. Department of the Interior
Bureau of Land Management
Alaska Outer Continental Shelf Office
P. O. Box 1159
Anchorage, Alaska 99501

Gentlemen:

Altho I attended the afternoon public meeting of your panel in Homer on October 14, my name was not on the list of those who offered testimony, and I would therefore like to submit the following:

It was probably apparent to the panel that the business community was not represented at the meeting. This is not due to a lack of interest, but rather to the fact that it is difficult to get away from a business establishment for an afternoon meeting.

I also noted that with one exception, the people testifying were comparative new comers to this area, and while their opinions are certainly valid, these opinions are not necessarily what 'Homer wants, or needs.'

As a business person, and a resident of the area for over 28 years, I would certainly not want to see any operations in Kachemak Bay that would damage or inhibit the fishing industry. However, from observation of oil production up the Inlet, and the fishery in that location, it does seem that the two industries can work in a cooperative atmosphere to the benefit of everyone. It does not seem reasonable to me when the energy situation is so critical and when we all use petroleum products for our homes, cars, boats, and businesses, that local residents should attempt to baulk the exploration for a vital source of energy in our location.

Homer has an excellent port, and we are looking forward to major expansion and I feel that support facilities could, and should, be offered for oil exploration in areas not found to be too delicate ecologically to be disturbed.

Yours very sincerely,
Margaret Pate
(Mrs.) Margaret Pate
P. O. Box 392
Homer, Alaska

ALASKA OCS OFFICE
ANCHORAGE, ALASKA
Oct 24 9 58 AM '80

Molloy
P.O. Box 4739
Kenai, Alaska 99611
Oct 22 1980

Alaska OCS Office
Boreau of Land Management
P.O. Box 1159
Anchorage, Alaska 99510

Dear Sir/Ms–

After examination of the Draft Environmental Impact Statement on the Lower Cook Inlet – Shelikof Strait Oil and Gas Lease Sale #60, I ask that you recommend cancellation of this sale.

Having lived and worked in this area I feel strongly that the disadvantages of such a sale, of further oil exploration, and of petroleum industry development far outweigh the advantages for the Kenai pennisula and Kodiak. I am more familiar with the Kodiak situation. This is a fishing community, a beautiful, paradise island. The people are fishermen or natives and they sustain themselves happily living with their seas and land. They would rather preserve their precious lifestyle and land for many many decades to come than to have an oil

2

boom, an increase in population and capital around for a few decades. Some villages are so small, having difficulty now dealing with changing times, lifestyles. The impact upon the natives and their lifestyles would be disastrous, immeasureable.

Homer people feel the same. They value their lifestyle, pace, fishing industry.

∴ I feel there are other areas which should be considered for oil exploration. Please cancel this sale and save our precious environment for ourselves. Thank you.

Yours truly –
Sandra Molloy

cc. Kodiak Island Borough OCS Advisory Council
Cecil Andrus, Dept. of the Interior
U.S. Fish + Wildlife Service

ALASKA OCS OFFICE
ANCHORAGE, ALASKA
Oct 27 12 03 PM '80

Alaska Outer Continental Shelf Office
Post Office Box 1159
Anchorage, AK. 99510
Re: DEIS OCS Lease Sale 60
Gentlemen:

I was working and unable to attend the public hearings recently held in Homer. I offer the following comments for your consideration:

1. The DEIS had some deficiencies, but nothing that cannot be remedied by a more knowledgable and experienced writer. Example - Ignoring the effects good and bad of existing platforms in the upper Inlet. Example: Number of oil spills predicted seems to be an off-the-wall guess not based on much of anything.

2. At this time I wonder how much interest the oil companies have in exploring the area. Last year's results were less than spectacular.

3. Not everyone in the Homer Area is against the sale. My guess is it would be about 50-50 like a lot of other issues around here. It is easier to mobilize a mob against than for a proposition.

4. Since you are part of the Federal Government I expect your decisions to be based on the national interest, but hopefully not running roughshod over legitimate local interests.

5. If you choose to hold the sale we have enough local resources to ride through the impacts and come out of it better than when we went in.

6. If there is a chance of contributing to the national energy picture, I would urge you to hold the sale.

S C Matthews
Box 1235
Homer, Alaska 99603

Oct 23, 1980
Kodiak, Alaska

OCT 27 9 54 AM '80

I am a Kodiak setnetter. I fish for a living. I setnet on the *Shelikof* Strait, close to [illegible]ganik *Bay*. I would like to state that I am *most* *emphatically* *opposed* to any & all drilling for oil on the Shelikof!!!

I am not only afraid of the distinct possibility of an oil spill wiping out a seasons *entire* salmon harvest for myself and my fellow fisherman; but I am also fearful of the consequences of oil drilling equipment (albeit inadvertantly) killing off or disturbing the patterns of migrating salmon. I make my livelihood fishing salmon, drilling for oil in my front yard is very likely to pose a severe threat to my successful salmon fishing.

Please consider my opinion as representative of many Kodiak salmon fishermen who did not submit a personal statement.

Respectfully submitted

ALASKA O.C.S. OFFICE
OCT 23 9 39 AM '80

P.O. Box 2612
Homer, Ak. 99603
Oct 24, 1980

U.S. Dept. of Interior
Alaska O.C.S. Office
P.O. Box 1159
Anchorage, Alaska 99510

Dear Sir,

I am writing to voice my opposition and concerns to the proposed oil and gas lease sale #60, for Lower Cook Inlet and Shelikof Straits.

I am strongly opposed to any oil development in this area because of the threat that it poses to the marine environment, the fishing and tourist industries, and the overall quality of life in the area I have chosen to make my home.

The area proposed for sale includes some of the most severe weather conditions to be found anywhere in Alaska. This very week an exploratory drilling rig that was working in the Lower Cook Inlet area broke loose and sank. Last winter a similar

-2-

incident nearly occured to another rig which was blown loose from the site where it was working. Fortunately these drilling operations were not into oil or there would have been an oil spill. Besides the inclement weather, this area is also known for its seismic activity and related geologic hazards. I have read the D.E.I.S. for Sale #60 and it states that four major oil spills are projected over the life of the oil development program. When Sale #60 plus the existing sale tract and tanker activities are combined the number of major spills expected increases to eleven, with a 99+% chance of at least one major spill occuring. This is extremely alarming to me for two reasons. First, the technology to contain oil spills in this environment is non-existent. Containment booms are functional in seas ≤ 5 or 6 feet and skimmers are

-3-

funtional in seas ≤ 2 or 3 feet. Regardless, the tidal currents alone would usually disperse the oil before it could be contained. The second reason is the close proximity of shoreline to the sale area. This assures a 94% chance of oil reaching shore within the first ten days after being spilled, when it is most toxic to life forms.

This area is biologically rich and very productive. Many forms of wildlife would be affected by a major oil spill, including birds, marine mammals and many species of shellfish and fin-fish which are *vital* to our local economy. In the years ahead, food resources will become increasingly important to feed a hungry world. It doesn't make sense

-4

to jepordize a valuable renewable resource for the Sake of oil. Besides the oil will never lose value in the ground. We can view it as money in the bank if the technology to safely recover it does someday become available.

What I would like to see happen in This country is a real awareness of and a commitment to energy conservation and alternative energy source development; Simply by adopting known technologies and energy conservation measures we could make this country energy independent within this decade, with out any undo suffering. This is the path which we must take, for if we continue to despoil our Envirion ment we will ultimately destroy ourselves in the process.

Very sincerely yours,

Carole Demers

Carole Demers

Oct 23, 1980

Secretary of the Interior
USDA BLM OCS office
Anchorage ak

ALASKA OCS OFFICE
ANCHORAGE ALASKA
Oct 29 1 02 PM '80

Dear Sir,

This letter pertains to the proposed gas and oil lease sale #60 of Lower Cook Inlet and Shelikof Straits. I have briefed the Draft Environmental Impact Statement and am very concerned that any alternative except "No Sale" be considered. The long term deliterious impacts of a major oil spill, stated as a 98% probability, in addition to the numerous adverse effects of minor spills, tanker traffic, underwater pipelines, noise, and other disturbances on a very delicate and valuable renewable marine resource would linger far longer than the short ~~on~~ 20 odd year life expectancy of the oil operation.

Our regional economy in the lower Kenai Peninsula and Kodiak Island depends largely on the health of the many fisheries and in turn the delicate balance of the waters. Tourism is a strong secondary industry and is based to a large extent on the beauty and diversity of our marine environment, not tarballs on the beach.

I urge you to consider the potential grim consequences of an oil discovery in an area notorious for its foul weather, earthquakes, and inaccessibility for such proposed oil operations, yet an area famous for its marine wealth and beauty.

Thankyou very much

Respectfully

Carol Griswold
Box 1915
Homer AK 99603

Oct.29,.980

This is written as a follow up to the OCS hearings held in Homer, and to perhaps clarify and go into the records, a reply to comments expressed to the Homer News by the federal officials conducting the hearing.

The public hearing was well announced over the public radio station, KBBI, as well as coverage in the Homer News. Cards for speakers and copies of the impact statement were available to everyone at the public library. It seems, yes, that one segment of the population did make this information ~~is~~ available to themselves at the libary and after reading the impact statement did testify at the public hearing. These people are also a cross section of the people who live in Homer and who care about the place in which they live. Through public testimoney or petitions the people represented mechanics, advertising, resort owners, secretaries, lawyers, contractors, food store owners, land developers, teachers, carpenters, chambermaids, resaurent owners and workers, retired people, charter boat operator, merchants, cannery workers, longshoremen, musicians, accountants, homesteaders, writers, farmers, artists, nurses, surveyors and fisherman. This is Homer-these are the people that make up the population of Homer.

The scoping meeting that was held in Homer in Aug. of 1979 was not well attended but I think you should also understand that the day of that meeting was also a salmon fishing period for commericial as well as subsitance fisherman, which is the time of year that many people would find it impossible to attend meetings.

I am sorry some of the following information was obtained too late to include in my own testimoney but I would like to present it at this time. I believe it should serve to correct some of the things Mr. Knowles, from ARCO, was stating.

May, 1962 Standard-Richfield-Shell Beluga #1 had a blowout in the inlet.

June, 1962 Pan-Am had a blowout at middle ground shoal #1 and was not brought under control for 43 days.

Aug, 1962 another blow-out in the inlet by Pan-Am.

For 34 months beginning in January of 1966, there were 140 sightings of oil pollution in Cook Inlet. Of these spills- 49 were of unknown origin, 1 was from a fishing vessel, 46 came from oil platforms, 9 from pipelines, 10 from shore facilities, 10 from tankers and 16 from explorations rigs and service vessels. Two of these spills were major spills of over 1,000 bbls.

Between 1972 and 1980 there were 98 spills in the Cook Inlet caused by the oil imsudsty, 112 spills from other sources and 40 spills from unknown sources.

This is not a good record and even if ARCO was not partailly responsible for some of these spills, the point is that the reasons for the majority of these spills rest on the fact oil developers caused them. This is not a good record when people living in this area are so dependant on the sea for their living, and for their food. This is not a good record when you consider the lower Cook Inlet and the Shelikof Straits have weather conditions ~~xxx~~ that are more severe than those in the Upper Cook Inlet.

Thank you,

Box 1075
Homer
Alaska 99603

Box 1323
Kodiak, Ak.
99615
Oct. 24, 1980

Alaska OCS Office
Bureau of Land Management
P.O. Box 1159
Anchorage, Ak. 99510

Testimony at Kodiak Public Hearing on OCS Lease Sale #60, Oct. 15, 1980

Note: the comments in () and the P.S. were added after speaking and hearing others testify.

My name is Betsey Myrick and I have lived in Kodiak for 10 years. My husband, Chris, who spoke earlier, has been fishing commercially here for 13 years. In 1971 & 2 we fished for halibut and dungeness crab on our own small boat in the Marmot Bay & Kizhuyak Bay areas. (This year I received the patent to 5 acres of "Open-to-Entry" land at Onion Bay on Raspberry Island, which I staked out in 1970.) This past summer we set-netted commercially for salmon with our twin 3 year old girls at Kekur Point. It is across Kizhuyak Bay from Talnik Point, the proposed tanker loading facility.

At first I wasn't going to speak at this hearing because I didn't think my testimony would carry any weight, since I'm not a biologist, a scientist, or a politician, and I don't really consider myself to be a "fisherperson". (However I have had both sport and commercial fishing licenses in Alaska.) But I speak as a mother, concerned about the future of our children.

I'm not a statistician either, but a few figures from the DEIS synopsis (prepared by the Kodiak Area Native Association's Outer Continental Shelf Advisory Council) jumped out at me : There is a 5% chance of finding recoverable oil + gas in this sale and a 98% chance of a major oil spill. To me, this doesn't even make good household common sense. Reportedly the cleanup of a spill could not be done in waves over 5 feet high. Last summer when fishing, if we heard a weather report of 5 foot seas, that meant it was flat calm! We were in a sheltered spot with an excellent summer weather-wise. We could often see white caps from the westerly winds as we looked across Kizhuyak Bay towards Talnik Pt. Our neighbor set-netter on the Kizhuyak side of Kekur Pt. had his skiff swamped by rough seas once this summer. I know that Shelikof Straits are worse. Winter weather is worse! (Whale Pass, the proposed pipeline route just around the corner from Talnik Pt., is not to be taken lightly either. It is notorious among boaters for strong tides and vicious currents. Skippers must check the tide tables before sailing through. If you buck the tide, at best it will take an Hour instead of 15 min. to navigate. At worst you go down, as the m/v Deep Sea did 4 years ago.)

At Kekur Pt. we could hear the Alaska State Ferry, Tustamena, coming from Seward to Port Lions long before we could even make her out as a tiny speck on the horizon. Sound carries far on the water. I feel that just the noise pollution alone from the helicopter and air traffic to the projected Port Lions airport, would be intolerable.

Set-netting is a low technology fishery. We would rather row or use sail than see an oil sale come to Kodiak. This summer we tried to live as much in harmony with nature as possible. We camped by the sea and put out our nets from shore in wooden boats. The kids ran barefoot on the beach with no tar on their feet. We saw seals, sea lions, otter, bear, weasels, whales, porpoises, deer, and many types of sea and land birds. We lived from May through September in a canvas wall tent with a small wood-burning stove for heat and cooking. Many of our meals were cooked on a stone fireplace on the beach. We ate fish every day. We did not cut any live trees for firewood, as there was more than enough driftwood. We used a propane camp stove until it ran out of gas. Then I ended up canning 2 cases of salmon on the wood stove. So, in effect, we lived a subsistence lifestyle. Some might consider it a poverty level existence. But for us it was like a dream come true to be there as a family. Nearly every year, Chris gets a deer from the area around Supreanof Straits. With subsistence salmon and halibut, we do not need to buy any meat or fish from the store. I feel very strongly that the impacts of an oil sale would ruin these subsistence resources for whites as well as natives.

We as a nation, need to change our lifestyles. We must give up our electric hot dog bun warmers. And I'm ready to change. Are you? I found this summer that it was easier than I imagined.

Oil is not going to last forever. It's time to develop our alternative renewable resources now, rather than raping the earth and polluting the air we breathe. There is tremendous power in the tidal action here. We have lots and lots of wind free for the harnessing. The summer sun gives us 20 hours of daylight. Passive solar heating is a real possibility here. (I spent a college year in the West Coast of Norway, where waterfalls were tapped for energy. Kodiak has similar rainfall and terrain to provide us with waterpower energy.) We also need to do much more towards conserving what energy we do have left. I see lights blazing away in town at night on buildings which are closed. (Namely the U.S. Post Office) We at home try to keep our winter heat between 65-68. We wear sweaters and long-johns (as when we were in England doing post-graduate work and living in a stone mansion without central heating). But I often swelter when in the overheated businesses and offices in town. Public transportation could be vastly improved. Houses leak precious heat. (We were surprized last year on a trip "outside" to see the number of big gas guzzling cars speeding way over the 55 limit and carrying only one person.)

So you can put me down for no sale. I feel very strongly that it is time to take the responsibility for our own actions in regards to being good caretakers of our planet. We must think seriously about what we do now and how it will affect the kind of world we are going to leave for our children.

Thank you,
Betsey A Myrick
Betsey A. Myrick

P.S. It seems that Mr.Knowles, from ARCO, who spoke later, was discounting our testimony because we had no facts, did not understand the oil company technology, and portrayed the worst possible case.

Being a mother of twins, I have no time to do statistical research. I've never spoken at a public hearing before, so I'm not an orator. But I have the actual experience of living here. And I have feelings about it. This must not be ignored. I lived for 18 years in a suburb of Washington, D.C., and I had never heard of Kodiak before I came here. So I know how hard it must be to comprehend what it is like here-- unless one listenes carefully to those who testified from their hearts as well as their heads.

If you want more facts, check the U.S. Weather Service for a year's record of the Kodiak Island waters marine weather reports. On how many days were there 5 ft. or less seas? Call the U.S. Coast Guard and ask how many lives and boats were lost in Kodiak waters in 1979. Ask Wien Air Alaska and Western Airlines, and Kodiak Western Alaska Airlines, how many flights to or from Kodiak are delayed or cancelled each year because of inclement weather here. Then check with the local air charter companys on their tally of

weather delays.

I so not trust the oil companys' technology. We came to Alaska to escape the kind of over-technology that brings us Three-Mile Island, Erie, and Rely tampons. Mr. Knowles over-simplified the risks involved by stating that they lower the drilling rig down so gently that no fish are squashed, implying that their technology can solve everything. As I write this, an Oil drilling platform has drifted loose and sunk in 60 knot winds and 30 foot seas southwest of Kodiak Island. In the same storm, the ferry Tustamena was not able to dock at Port Lions and was delayed in returning to Seward by high seas in the Marmot Bay area.

Yes, Dave Kubiak was dead right. We do get the worst possible case here. A ride during a winter gale on the Tustamena will convince even the most firm disbeliever. And it's not only the "worst Possible case" that scares us. Even if there could be no possibility of an oil spill, we are still worried that the other oil related activities combined will ruin this bit of last frontier forever.

Our fishing experience was not entirely a picnic. We worked long, hard hours from dawn to dusk. Sea lions and sharks tore holes in the nets while stealing fish. Bugs bit us. We got fish poisoning and jelly fish stings in our hands. Our fresh water stream dried up and we had to haul drinking water 1 mile. We had little time for a bath except in cold sea water. We smelled of rotten fish and wood smoke. There was a constant battle to keep the nets free of seaweed. But we were working together as a family, instead of being apart for 5 months as happened when Chris used to halibut fish. And most importantly, we were our own masters. There could never be any other kind of compensation for this from the oil companies. If we wanted to work on an oil rig, we would have gone to the North Slope or Texas.

We did not get rich fishing, but we were able to earn a good portion of our year's income in 3 months. The real rewards were intangible ----- white -winged seagulls circling high into a steel-blue sky --- the corks of our nets bobbing in a gentle sea --- the green hills of Sharatin Bay still dotted with snow in August --- our twin daughters asleep in the bow of our skiff as we filled it with silvery salmon ---- and unfolding over all, a double rainbow and peace.

Fish are a renewable resource. Oil is not. Oil and water do not mix.

China Poot Bay
Oct 27

ALASKA OCS OFFICE
Oct 3[illegible] 10 44 '80

Dear Sirs

Just a short note concerning the oil lease sales in lower Cook Inlet.

It seems that with the frustrating inability of citizens to protect the environment from private and public agencies; an appreciation of the environment becomes useless. With increased development, the plight of our coastal waters will provide a crucial test in the race between heedless exploitation and rational management. Oil rights must not be permitted to obliterate the rights of Americans to enjoy uncluttered ocean views, unpolluted seascapes and beaches, and unimpaired fisheries. The only ones to gain will be the oil industry, and it cannot be denied that our oceans are becoming increasingly more polluted as a result of this same industry.

It appears that the age of the dream of progress is over, and the quest for preservation has begun.

Oppositionally

Nancy S.

China Poot Bay
via
Homer, Alaska
99603

Phone/Radio Contact
(907) 235-8910

Kachemak Bay Wilderness Lodge

Registered Guide · [illegible]
Lodge, Cabins, [illegible]

"Alaskan Wilderness Adventure"

ALASKA OCS OFFICE
OCT 31 8 24 AM '80

Oct. 25, 1980

Alaska O.C.S. Office
Bureau of Land Management
P.O. Box 1159
Anchorage, Ak. 99510

Dear Gentlemen:

We would like it known that we are absolutely opposed to the oil lease sale #60, especially the lower Cook Inlet and Shelikof Straits areas.

We believe that the oil lease sale is not in the best interest of all persons, particularly those who live on the neighboring coastal zones. It is a fact that the Environmental Protection Agency stated that the salt marsh areas would be drastically affected by one oil spill. Science Applications did a study for the E.P.A. in 1978 and 1979. Detritus, the beginning of the oceanic food web, would be harmed to such an extent that all forms of oceanic life would suffer.

As naturalists and biologists, we feel it our human obligation to protect these incredibly productive waters. We are totally opposed to any oil lease sales in this area of Alaska.

Thank you for the oportunity to voice our opinions.

Respectfully submitted,
Diane O. McBride
Michael P. and Diane O. McBride

best copy available

Kenneth R. Carrasco
Box 1523
Kodiak, Alaska 99615
October 28, 1980

Alaska OCS Office
Bureau of Land Management
P.O. Box 1159
Anchorage, Alaska 99510

Sirs and Madames:

A spokesman from Chevron U.S.A. made a blatantly false statement at the OCS hearings on Offshore Sale #60 in Kodiak this October fifteenth. As a biologist by training and profession, I was appalled to hear him state there has never been any evidence that oil damages larvae of marine life. For proof he cited experiments done on lobster in Maine and Littorina spp. in California.

It is widely known in the biological community, however, that there actually has been significant evidence that oil does indeed harm marine larvae. Just as one example of the research accomplished, I am enclosing a photocopy of a study done on a local, economically important species: "Ultrastructual Effects of Crude Oil on Early Life Stages of Pacific Herring" published in the respected Transactions of the American Fisheries Society. Using an electron microscope to examine the effects of crude oil on the structural components within the cells of herring larvae, the article concludes with ". . . there were significant differences in the ultrastructural appearance of these organisms. The disruptions noted would severely decrease survival potential for the larvae, especially as energy demands for growth, feeding, and predator avoidance at this stage are high." Please note that I did not have to reach 6000 miles or so to Maine for supporting evidence, as Chevron U.S.A. did, but rather right here in our own biological "neighborhood". This species of herring, incidentally, is not only important to herring fishermen per se but also figures as the bait used by our crab fishermen; the cost as such figures importantly in their overhead. Furthermore, you might additionally note in the "Literature Cited" section of this paper that similar findings have been determined in studies of king crab and several species of salmon.

It is a disappointment to me to learn that the oil industry is apparently so ignorant of the environmental effects of oil known so well to the rest of the scientific community. Or perhaps hold so little regard for the OCS Board and the community of Kodiak that they feel uninhibited in making this kind of statement.

Thank you for listening,

Kenneth R. Carrasco

Enclosure

Statement of testimony as given to the OCS advisory panel on Oct. 15, 1980, in Kodiak, Alaska.

Submitted by: Derrell R. Short
Port Bailey
Via Kodiak, Alaska 99615

My wife, daughter, and I live year-round on Bare Island located in Dry Spruce Bay adjacent to Kupreanof Straits. I own a salmon seiner and fish salmon, King and Tanner crab from Uganik Bay to Marmot Bay, Primarily. I live and make my living in the area most likely to be affected by oil-related activities in Shelikof Straits.

I am testifying here today to go on record as being opposed to any and all oil development in the waters surrounding the Kodia k Archipeligo, not just because my family stands to be adversely affected by oil-related activities, but because I object to any development that may be detrimental to the marine environment.

Considering statements made in the DEIS for Lease Sale #60, about the potential dangers, long-term and short-term, to the local environment, development of marine reserves of petroleum should be the very last resort. This means marine development after all land-based alternatives are explored. Marine oil spills, chronic and acute, cause much more far-reaching and long-term damage than any on land.

I believe two of the biggest and most emminent dangers our nation, and the world, face are chemical pollution and ecological imbalance. Offshore oil development is, in my opinion, one of the most threatening to the marine environment in both of these areas.

Extremely large populations of sea-birds, sea-mammals, King and Tanner Crabs, and salmon, live in and travel through the Kupreanof Straits. I would guess it to be one of the most fertile areas, for its size, in the Gulf of Alaska,and possibly, the world. The largest concentrations of Kittiwake gulls in the world nest in this area, mostly on Whale Island. Aside from the direct dangers of chronic oil spills to sea life, there are the insidious, hidden dangers of chemical polution to fish species from oil, sunken and dispersed by detergents, and toxic drilling muds.

These are things of concern to the nation but I am, of course, primarily concerned about the deterioration in the quality of life I and my family might face, in the long-term. Increased boat traffic with the resulting destruction of crab gear, chronic small oil spills tainting the clams, and a disturbed local economy are the least of our worries if there should be a major spill. I was in Santa Barbara, Calif. on vacation during their oil tragedy. It wasn't pretty! Contrary to what the oil people might tell you, there's still oil in the beach sand at Santa Barbara, and in that area there never has been the concentration of sea life that you see in Kupreanof Straits, Marmot Bay, and Shelikof Straits.

In your recommendation to the Secretary of the Interior, I would especially hope you'd keep in mind the effects of any oil activities on the large amount of people living a subsistence lifestyle in this area and on the many species especially sensitive to oil, such as Sea Otters, Kittiwakes, and fur seals.

Testimony for Draft ENvirinmental Impact Statement for OCS Lease Sale #60

My name is Katnie Short. I have lived in Alaska most of my 30 years. I was raised on Afognak and Raspberry Islands and in the town of Kodiak. And I grew up in a family of fishermen.

I now live year-round on Bare Island in Kupreonoff Straits with my husband and daughter. We own a boat, making our living fishing salmon on the west side of Kodiak Island and crab in Kupreonoff Sts. We hunt and fish for our own food as well. We love the way we live and can't imagine any other way of life.

There are also 3 other families in Dry Spruce Bay, not counting anyone at Port Bailey, who have similar lifestyles.

I am against a sale in Shelikof STs. I know the risk of oil spills and leakage is very high and poses a very real danger to fishing, the only economic base the people of Kodiak have, not to mention the resource damage. The oil industry does not have the ability to clean up or contain an oil spill at all in the kind of weather conditions existing in these waters. I don't believe the oil companies can really do much in the best of circumstances anywhere in a marine environment, so the search of oil should, at this time be limited to the land where the damage to resources is much decreased.

I was in Santa Barbara, California in 1969 on my honeymoon when one of the off-shore wells blew there. I understand the problem was caused because the well was drilled near a fault in the ocean floor, (plenty of which we have around here)and the leakage could not be stopped. I don't know how much crude oil went into the ocean; I don't know the statistics, the facts and figures, but I saw the beaches and the dead marine life, and the futile efforts to clean-up. A year and a half ago, my husband and I saw that the shoresare not yet clean. I don't know if the tar that adheres to feet and clothing is washing up yet from that diaster, or is the result of constant leakage from the offshore wells there, but the mess is there.

I am against the proposal of a pipeline down Kupreonoff Sts., going overland from Chernof Pt. to a tanker loading facility at Talnik Pt. resulting in tanker traffic in Marmot Bay. Shelikoff Sts., Kupreonoff Sts., and Marmot Bay are all important fishing grounds for salmon and crab. Besides the danger to the marine life, the boats , gear, and lives, too, would be endangered by tanker traffic. These huge vessels can't stop or turn easily so crab gear and vessels in the way could be run down. There are also a great deal of other traveling craft in these waters, besides fishing boats, people going to and fro the villages and outlying homes like my own. There are pleasure crafts out from town with hunters, sports fishermen and picnicers. Just several weeks ago, I came out from town in my open boat, a skiff, with my 21/2 year-old child curled up sleeping on a blanket. It was quite foggy, and while I certainly don't have radar, I know the area and felt confident about traveling. It would have been different to know that one of those tankers could loom up out of the fog toward me or from behind.

And I am against the possibility of Whale Pass and Shuyak Sts. being alternate tanker routes. It seems madness to me that they are even suggested, as narrow and rock-ridden as they are, with sea conditions ever complicated by strong tides.

I also understand that the proposed pipeline route would be restricted for fishing as would be 1 mile square around any oil rigs. Why should commercial fishermen using these grounds for many years accept their loss? There are many people whose livelihood comes from these areas.

To sum up my feelings about the proposed Shelikoff Sale, I think the chance of my lifestyle and way of making a living being destroyed is too great. I can't see any advantages in off-shore development to the Kodiak area at all, other than the nation as a whole needing fuel oil. And we in Kodiak need oil to heat our houses and to power our boats. But I think the United States is a fuel hog, and that has got to stop. Why should we here in Alaska sacrifice our way of life so people can drive Cadillacs endlessly on the freeways of America. It is just one more thing that the goverment is trying to ram down our throats, conning us all the while into believing we need it.

ALASKA OCS OFFICE
NOV 3 11 32 AM '80

Dear Sirs,

I would like to make some comments on the draft environmental impact statement for the Lower Cook Inlet and Shelikof Strait.

I am a three year resident of Kodiak. I earn my living fishing the surrounding waters both with my own skiff and as a crewmember on larger vessels.

I definitely question the wisdom and desireability of drilling in the Shelikof Strait when there is only a 5% chance of finding oil. The Shelikof Strait and the bays bordering it contain such a vast wealth of harvestable sealife not to mention incredibly bad weather, strong tides, and active fault lines, volcanoes [illegible]; is a 5% chance even worth the trouble, not considering the risks. When you do consider the risks, 98% chance of a spill if oil is discovered, the prospect of drilling is worse than unwise, it is insane. Due to the limits of the oil spill cleanup technology, no containment in over a 5 feet sea, it is clear to me that the chances of containment are something like the chances for finding oil in the first place. A five foot sea in the Shelikof as any local fisherman can tell you is unusually good weather.

In short, oil drilling and transport around Kodiak is at best a short term development with minimal advantages and irrevocable changes in our life style; at worst Kodiak's major industry, fishing, could be ruined. Surely one of America's richest fishing grounds has as much value to us and the world as a 5% chance of finding Petroleum.

Sincerely,

Jody Webb
Box 2010
Kodiak, AK. 99615

ALASKA OCS OFFICE
ANCHORAGE, ALASKA
NOV 3 10 22 AM '80

October 30, 1980
Box 2494
Homer AK 99603

Alaska OCS Office
Bureau of Land Management
P.O. Box 1159
Anchorage, Alaska 99510

Hello,

I support Alternative II - "No Sale" as outlined in the Draft Environmental Impact Statement for the proposed OCS Oil and Gas Lease Sale #60 for the following reasons:

The information contained in the DEIS describing the adverse enviromental impacts that could result from exploration and development of oil in the Lower Cook Inlet and Shelikof Strait clearly supports this alternative. Specifically we refer to such statements as "There is a 5% probability that oil would be discovered in economically recoverable amounts." contrasted with the statement "Oilspills have a 94% chance of impacting coastal habitats due to the expanse of relatively close shoreline surrounding the lease sale area." The strong possibility of oilspills and the resulting environmental damage do not justify a 5% probability of economically recoverable oil. A sale such as this should be predicated on a technology and local personpower that could adequately clean up an inevitable oil spill in the dangerous seas of Shelikof Strait. At present we do not have this.

As residents of Homer we strongly object to the impacts further development of oil and gas would have on this area. Environmental impacts from oil spills and from staging, support and storage site development is totally unacceptable. Where are the "Suitable industrial sites available in Homer..."? Furthermore the impact on the Homer areas comes not only from activities in the immediate area but also from activities in other communities on the Kenai Pennisula and surrounding area. The constructions and operation of processing facilities, LNG plants and oil refineries could only have a negative impact on life in Homer.

Economic impacts to the city of Homer of oil and gas development would ultimately lead to a situation of increased inflation. The DEIS lists fishing and tourism as the mainstays of the Homer economy. These are environmentally and socially healthy industries that provide for a stable long term economically secure future. Oil and gas development would disrupt and possibly destroy these industries.

The overall quality of life in Homer is something that is rapidly disappearing from other parts of the country. To go ahead with this sale seriously threatens something that is consciously or unconsciously important to every resident of the Homer area.

As we see it the impacts of Alternative II are both positive and encouraging. The DEIS states: "To eliminate the proposed sale may reduce OCS oil and gas production, require escalated imports of oil and gas and create the national need to develop alternative energy to reduce the impacts from cancellation of the sale." Americans use twice as much energy as nations with the same standard of living. There is abundant room in the average American lifestyle for conservation. This is a viable alternative to "escalted imports of oil and gas" along with a strong emphasis on other energy forms. Furthermore these probable impacts are a positive step toward a more sane energy policy for Alaska and the lower 48, a policy that has been clearly articulated by the physicist Amory Lovins. Briefly this policy would combine a serious commitment to efficient use of energy, rapid development of renewable energy sources that are matched in scale and in energy quality to end use needs and special but carefully considered transitional fossil-fuel technologies.

Finally, it is important that any decision on Lease Sale #60 be coordinated with local planning. The "Kenai Pennisula Borough Coastal Development Program" should be given complete public review and be approved by local and state government before any sale of tracts in the Lower Cook Inlet and Shelikof Strait takes place.

Please consider these remarks and those of others in this area carefully in making your decision on Lease Sale #60. Thank you for the opportunity to provide imput in this issue.

Sincerely,

Julene Sohlack
Charlie Reukert
Susan Arndt
Peter L. Thielke

October 31, 1980

M.A. Hickey
P.O. Box 1907
Kodiak, AK 99615

ALASK
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To whom it may concern

For the past three years I have been fishing herring and halibut in the Kodiak waters on the F/V Phidoux. I've had particular success in the bays located in the Shelikof straits area. I am dependent on the quality of these waters for my livelihood.

Most of the people in Kodiak are dependent either directly or indirectly on the fish catch of the Shelikof straits area.

Please do not take any chances that may lead to the destruction of Kodiak's fish stocks.

I wish you could take a cruise through the straits. The days out of the year when it's seas are five feet and under are only a handful. If an oil spill occurs and is unable to be controlled, you will have made a big mistake, but we will have to pay the dues.

I wish to go on record opposed to the proposed Oil and Gas lease Sale 60, Lower Cook Inlet and Shelikof Strait.

The beauty of Kodiak is what attracted me to the island. Part of that beauty is the lack of predictability in nature. I caution you not to mess with it.

Thank you for your time and effort in gathering our oral and written comments.

Sincerely,

Mary Ann Hickey
F/V. Phidoux
P.O. Box 1907
Kodiak. AK 99615

Peggy McIntyre
Testimony regarding OCS Lease Sale 60
Hearing held in Homer, Alaska, October 14, 1980

NOV 3 '80

This will be the written version of the testimony I gave regarding the OCS oil and gas lease sale 60 at the hearing in Homer, on October 14, 1980, which was impromptu -- and very nervous and disorganized -- because I was called on the day before I was scheduled. This copy should supercede my oral testimony.

***

It seems that one of the most eloquent arguments against the oil and gas lease sale 60 is the Draft Environmental Impact Statement itself. With this document in its hand, how can the Dept. of the Interior consider proceeding with the lease sale in question? Why is it willing to run risks of damage ranging from certain to "unquantifiable" and "unknown" to this area so rich in food resources? There was a spot on the University of Alaska's "60 Seconds of Science" radio program lately that stated that one out of every twenty-five fish eaten in the world is caught in Alaska. The Shelikof Strait-lower Cook Inlet-Kachemak Bay area is one of the major sources of seafood in the world. Why are we willing, after years and years of wasteful consumption of our nonrenewable resources, to risk irreparable damage to this vital area? How can we do all this in good conscience, when we have neither conserved the energy we have nor developed alternatives? And why have we chosen to concentrate drilling in the sea, which is more dangerous, rather than on sites on land, which are safer, and, as I understand it, in the case of the Alaska Wild Life Range and the Naval Petroleum Reserve, more likely to be productive. That would seem the lesser of two evils to me. Neither of these alternatives is easy for many of us to swallow, many of us who for 20 years have been fighting for a coherent conservation and alternative energy policy and predicting the current "rape and ruin" program. We still do not have a coherent conservation program and are only beginning to think about alternative energy. I suspect that the answer to many of the questions above lies in political decisions made behind locked doors and the Military's large extended hand.

In my testimony, I would like to focus on a factor only obliquely referred to in the DEIS. In fact, it may not be understood in Washington, D.C., that there exists in this area what is referred to locally as the "subsistence culture". This is a viable lifestyle participated in by a significant proportion of the population of the Homer area. It has existed throughout the lifetime of the town, and although there are no official figures and no formal survey has been conducted (as was done in English Bay) to determine its exact profile, I would guess it includes at least half of the population in the outlying area around Homer which depends on Homer for its supplies, jobs and social activities, etc.

Now, I would like to hasten to clarify just what this subsistence lifestyle entails. There may be the impression back East that it is simply an agreeable lifestyle for those who practice it, and that if anything happened to the economy or to the fish and shellfish resources upon which we depend for food, that we would just have to modify this lifestyle and find full-time jobs in town. This is a misunderstanding. Even if we could shrug our shoulders and turn our backs on our chosen way of life, there ARE NOT enough jobs in Homer to support us. So far, a delicate balance exists between the two lifestyles which have characterized Homer since its inception: a conventional city- and job-oriented lifestyle, and one depending on a more direct and self-reliant relationship with the environment supplemented by part-time and/or free-lance employment. As steady growth progresses and land available for gathering berries and edible plants and firewood dwindles, we look more to our gardens and are working energetically to develop alternative sources of energy (I live in a partially solar house and use relatively little wood and coal for heat; next spring I plan to build a solar greenhouse which will circulate warm air through the house, making it virtually completely solar). However, right now there are as many as 30-50 applicants for many full-time (skilled) jobs. In the event of serious depletion of our resources here, due to actual damage from oil spills or oil slicks, etc., and /or to an influx of people encouraged by real estate speculators to expect an oil boom here (this is already beginning to happen, as postage-stamp subdivisions proliferate), not only would the town's economy suffer, since the commercial fisheries and tourism, our principal source of jobs and income, would be among the first to be impacted, but all of a sudden there would be a huge demand for employment from the large number of residents previously marginally employed. Especially in the case of an oil spill, we would be completely disenfranchised. I might point out, by way of emphasizing my point, that the area at the base and immediately adjacent to the Spit and the boat harbor is a major clam and mussel bed. I obtain most of my protein for the winter here, right in town, without even having to gas up my car to search elsewhere. This area would, of course, be extremely vulnerable if the boat harbor should be used as an oil supply depot, or even worse, a terminal. And then there is the pipeline proposed to Anchor Point, so close to Kachemak Bay, which has been designated a critical habitat area.

In summary, I feel some hard research needs to be done on the subsistence economy in the Homer area, and included in the Environmental Impact Statement; it should examine the types of subsistence activity participated in and the number of people involved, the opportunities for recovery from some sort of damage, such as an oil spill, etc.

Since both the environment and all aspects of the Homer area's economy, and that of the other areas involved in this lease sale 60, such as Kodiak, which would face the spectre of possible oil development on both sides of the island, are so seriously in jeopardy as a result of oil activity in Shelikof Strait and lower Cook Inlet I would concur with the position of the Kachemak Bay Conservation Society as stated by Kenton Bloom, and will do everything in my power, of a peaceable and nonviolent nature, to bring about a halt to oil development in this area. A much wiser course of action would be to take advantage of Homer's active interest in and development of alternative energy sources, such as solar and wind. Government encouragement of this program in Homer would hasten our independence from nonrenewable resources, protect the environment and this area so rich in food resources, and provide much needed employment.

Thank you for the opportunity to present my viewpoint.

Peggy McIntyre
P.O. Box 1702
Homer, Alaska 99603
October 31, 1980

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